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A01N-057/08

(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Substituted 1H-3-Aryl-Pyrrolidine-2,4-Dione Derivatives

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(57) 21 Claims

Notice: This application is as filed and may therefore contain an incomplete specification.

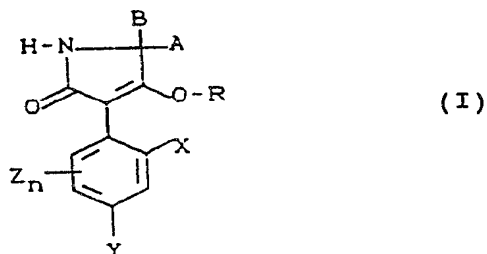
Canada

CCA 3254 (10-92) 41 7530-21-936-3254

Substituted 1H-3-aryl-pyrrolidine-2,4-dione derivatives

A b s t r a c t

There are provided novel substituted 3-aryl-pyrrolidine-2,4-dione derivatives of the formula (I)



in which

X represents alkyl, halogen or alkoxy,

Y represents hydrogen, alkyl, halogen, alkoxy or halogenoalkyl,

Z represents alkyl, halogen or alkoxy,

n represents a number from 0-3,

A represents hydrogen, or represents alkyl, alkoxyalkyl or alkylthioalkyl, each of which is optionally substituted by halogen, cycloalkyl which is optionally interrupted by hetero atoms, or represents aryl, arylalkyl or hetaryl, each of which

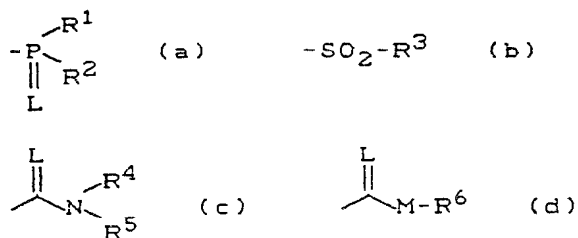
is optionally substituted by halogen-, alkyl-, halogenoalkyl-, alkoxy- or nitro,

B represents hydrogen, alkyl or alkoxyalkyl,

or in which

A and B together with the carbon atom to which they are bonded form an optionally substituted saturated or unsaturated cycle which can be interrupted by oxygen and/or sulphur.

R represents the groups



in which L, M as well as R^1 , R^2 , R^3 , R^4 , R^5 and R^6 have the meaning given in the text of the application.

The new compounds (I) have highly pronounced insecticidal, acaricidal and herbicidal properties.

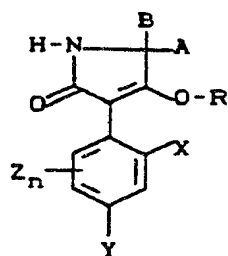
The invention relates to new substituted 3-aryl-pyrrolidine-2,4-dione derivatives, to a plurality of processes for their preparation, and to their use as insecticides, acaricides and herbicides.

5 3-Acyl-pyrrolidine-2,4-diones have previously been described as having pharmaceutical properties (S. Suzuki et al Chem. Pharm. Bull. 15 1120 (1967)). Furthermore, N-phenyl-pyrrolidine-2,4-diones were synthesised by
10 R. Schmierer and H. Mildenberger, Liebigs Ann. Chem. 1985 1095. A biological activity of these compounds has not been described.

EP-A 0,262,399 discloses compounds (3-aryl-pyrrolidine-2,4-diones) which have a similar structure but which were not known as having a herbicidal, insecticidal or acaricidal action.
15

DE-A 3,525,109 discloses 1 H-3-arylpyrrolidine-2,4-diones which have a similar structure and which are used as intermediates for the syntheses of dyestuffs.

New substituted 3-aryl-pyrrolidine-2,4-dione derivatives
20 have now been found which are represented by the formula (I)



(I)

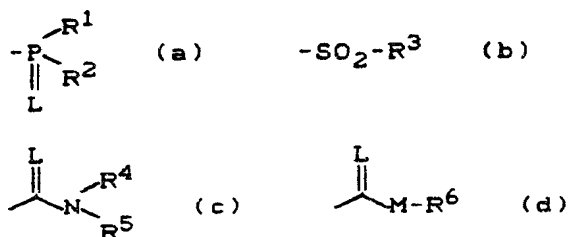
in which

- X represents alkyl, halogen or alkoxy,
- Y represents hydrogen, alkyl, halogen, alkoxy or
5 halogenoalkyl,
- Z represents alkyl, halogen or alkoxy,
- n represents a number from 0-3,
- A represents hydrogen, or represents alkyl, alkoxy-
10 alkyl or alkylthioalkyl, each of which is optionally
substituted by halogen, cycloalkyl which is option-
ally interrupted by hetero atoms, or represents
aryl, arylalkyl or hetaryl, each of which is
optionally substituted by halogen, alkyl,
halogenoalkyl, alkoxy or nitro,
- 15 B represents hydrogen, alkyl or alkoxyalkyl,

or in which

A and B together with the carbon atom to which they are bonded form an optionally substituted saturated or unsaturated cycle which can be interrupted by oxygen and/or sulphur,

5 R represents the groups



in which

10 L and M represent oxygen or sulphur, and L and M do not simultaneously represent oxygen,

15 R¹, R² and R³ independently of each other represent alkyl, alkoxy, alkylamino, dialkylamino, alkylthio, alkenylthio, alkynylthio and cycloalkylthio, each of which is optionally substituted by halogen, and represent in each case optionally substituted phenyl, benzyl, phenoxy or phenylthio,

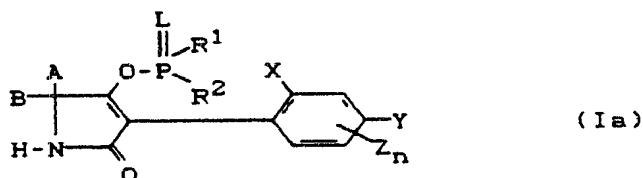
20 R⁴ and R⁵ independently of each other represent hydrogen, or represent alkyl, alkenyl, alkoxy

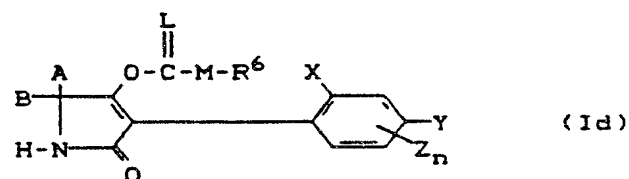
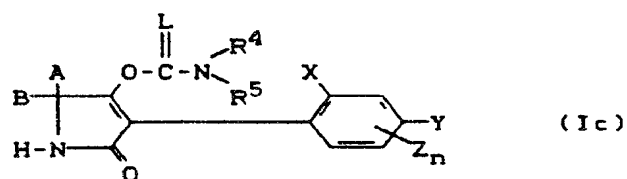
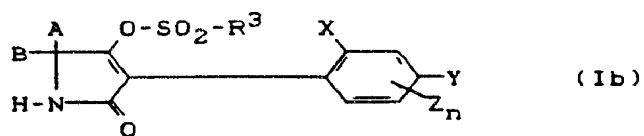
or alkoxyalkyl, each of which is optionally substituted by halogen, or represent optionally substituted phenyl or optionally substituted benzyl, or R^4 and R^5 together represent an alkenyl radical which is optionally interrupted by oxygen,

R^6 represents alkyl which is optionally substituted by halogen and which can be interrupted by oxygen, or represents phenyl which is optionally substituted by halogen, halogenoalkyl or alkoxy, or represents benzyl which is optionally substituted by halogen, halogenoalkyl, alkyl and alkoxy, or represents alkenyl or alkynyl,

and the pure enantiomeric forms of compounds of the formula (I).

Taking into account the various meanings (a), (b), (c) and (d) of group R of the general formula (I), the following main structures (Ia) to (Id) result:



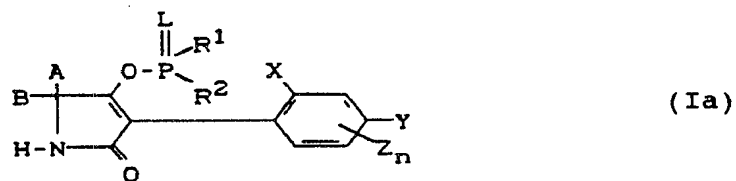


in which

5 A, B, L, M, X, Y, Zn, R¹, R², R³, R⁴, R⁵ and R⁶

have the abovementioned meanings.

Furthermore, it has been found that 3-aryl-pyrrolidone-2,4-dione derivatives of the formula (Ia)

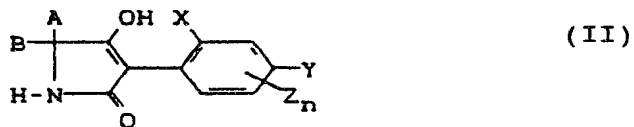


in which

A, B, L, X, Y, Z, R¹, R² and n have the abovementioned meaning

are obtained when

- 5 A) 3-aryl-pyrrolidine-2,4-diones of the formula (II) or the enols thereof



in which

A, B, X, Y, Z and n have the abovementioned meaning

- 10 are reacted with phosphorus compounds of the general formula (III)



in which

L, R¹ and R² have the abovementioned meaning

- 15 and

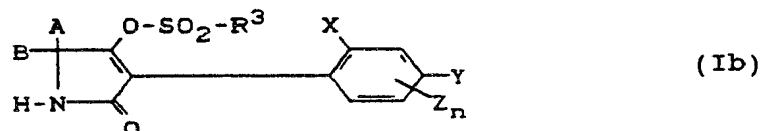
Hal represents halogen, in particular chlorine and

bromine,

if appropriate in the presence of a diluent, if appropriate in the presence of an acid-binding agent and if appropriate in the presence of a phase-transfer catalyst.

5

B) Furthermore, it has been found that compounds of the formula (Ib)



in which

10

A, B, X, Y, Z, R³ and n have the abovementioned meaning

are obtained when compounds of the formula (II)



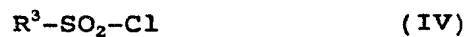
in which

15

A, B, X, Y, Z and n have the abovementioned meaning

are reacted with sulphonyl chlorides of the general

formula (IV)

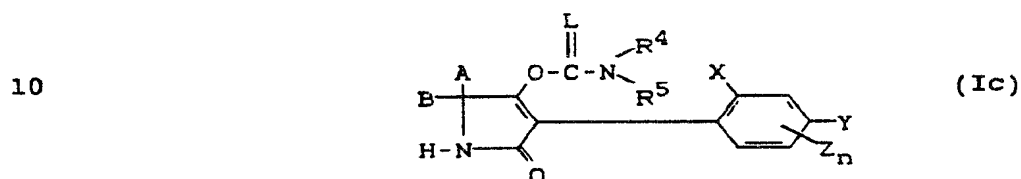


in which

R^3 has the abovementioned meaning,

5 if appropriate in the presence of a diluent and
if appropriate in the presence of an acid-binding agent.

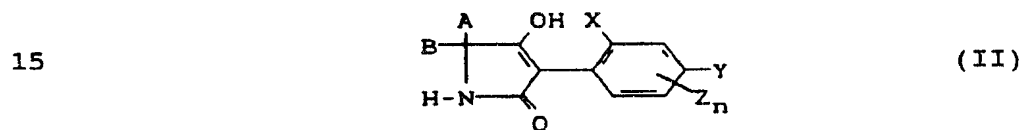
C) Furthermore, it has been found that compounds of the
formula (Ic)



in which

A, B, L, X, Y, Z, R^4 , R^5 and n have the above-mentioned meaning,

are obtained when compounds of the formula (II)



in which

A, B, X, Y, Z and n have the abovementioned meaning
are either

- α) reacted with isocyanates of the general formula
(V)



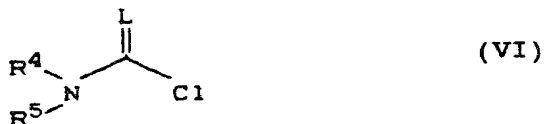
in which

R^4 has the abovementioned meaning,

if appropriate in the presence of a diluent and
if appropriate in the presence of a catalyst,

10 or are

- β) reacted with carbamic acid chlorides or thio-
carbamic acid chlorides of the general formula
(VI)



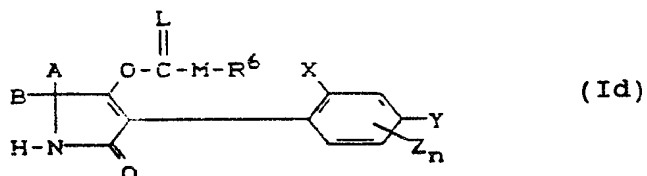
15 in which

L, R^4 and R^5 have the abovementioned meaning,

if appropriate in the presence of a diluent and

if appropriate in the presence of an acid-binding agent.

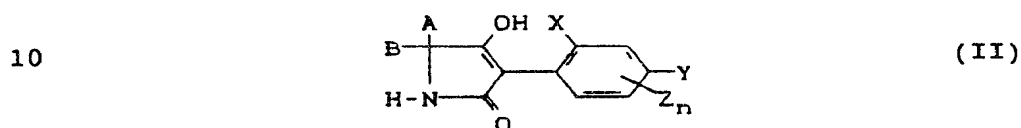
- D) Furthermore, it has been found that compounds of the formula (Id)



in which

A, B, L, M, R⁶, X, Y, Z and n have the above-mentioned meaning,

are obtained when compounds of the formula (II)



in which

A, B, X, Y, Z and n have the abovementioned meaning

- α) are reacted with chloromonothioformic esters, chloroformic thioesters or chlorodithioformic esters of the general formula VII



in which

L, M and R⁶ have the abovementioned meaning,

if appropriate in the presence of a diluent and
if appropriate in the presence of an acid-
binding agent,

5

or

β) are reacted with carbon disulphide and subse-
quently with alkyl halides of the general
formula VIII

10

R⁶-Hal

(VIII)

in which

R⁶ has the abovementioned meaning

and

Hal represents chlorine, bromine or iodine.

15

Surprisingly, it has been found that the new substituted
1 H-3-aryl-pyrrolidine-2,4-dione derivatives of the
formula (I) are distinguished by outstanding insecti-
cidal, acaricidal and herbicidal actions.

Preferred substituted 1 H-3-aryl-pyrrolidine-2,4-dione

derivatives of the formula (I) are those in which

- X represents C₁-C₆-alkyl, halogen or C₁-C₆-alkoxy,
- Y represents hydrogen, C₁-C₆-alkyl, halogen, C₁-C₆-alkoxy or C₁-C₃-halogenoalkyl,
- 5 Z represents C₁-C₆-alkyl, halogen or C₁-C₆-alkoxy,
- n represents a number from 0-3,
- 10 A represents hydrogen or in each case straight-chain or branched C₁-C₁₂-alkyl, C₃-C₈-alkenyl, C₃-C₈-alkinyl, C₁-C₁₀-alkoxy-C₂-C₈-alkyl, C₁-C₈-polyalkoxy-C₂-C₈-alkyl and C₁-C₁₀-alkylthio-C₂-C₈-alkyl, each of which is optionally substituted by halogen, or represents cycloalkyl which has 3-8 ring atoms and which can be interrupted by oxygen and/or sulphur, or represents
- 15 aryl, hetaryl or aryl-C₁-C₆-alkyl, each of which is optionally substituted by halogen, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₁-C₆-alkoxy or nitro,
- B represents hydrogen or in each case straight-chain or branched C₁-C₁₂-alkyl or C₁-C₈-alkoxyalkyl,
- or in which
- 20 A and B together with the carbon atom to which they are bonded form a 3-to 8-membered saturated or unsaturated ring which can be interrupted by oxygen

and/or sulphur and which can be substituted by in each case optionally halogenated alkyl, alkoxy or phenyl and halogen,

R represents the groups

5



in which

L and M in each case represent oxygen or sulphur and L and M do not simultaneously represent oxygen,

10

R¹, R² and R³ independently of each other represent C₁-C₈-alkyl, C₁-C₈-alkoxy, C₁-C₈-alkylamino, di-(C₁-C₈)-alkylamino, C₁-C₈-alkylthio, C₂-C₅-alkenylthio, C₂-C₅-alkinylthio and C₃-C₇-cycloalkylthio, each of which is optionally substituted by halogen, or represent phenyl, benzyl, phenoxy or phenylthio, each of which is optionally substituted by halogen, nitro, cyano, C₁-C₄-alkoxy, C₁-C₄-halogenoalkoxy, C₁-C₄-alkylthio, C₁-C₄-halogenoalkylthio, C₁-C₄-alkyl or C₁-C₄-

15

20

halogenoalkyl,

5 R^4 and R^5 independently of each other represents C_1-C_{20} -alkyl, C_1-C_{20} -alkoxy, C_2-C_8 -alkenyl or C_1-C_{20} -alkoxy- C_1-C_{20} -alkyl, each of which is optionally substituted by halogen, or represents phenyl which is optionally substituted by halogen, C_1-C_{20} -halogenoalkyl, C_1-C_{20} -alkyl or C_1-C_{20} -alkoxy, or represents benzyl which is optionally substituted by halogen, C_1-C_{20} -alkyl, C_1-C_{20} -halogenoalkyl or C_1-C_{20} -alkoxy, or together
10 represent a C_2-C_6 -alkylene ring which is optionally interrupted by oxygen,

15 R^6 represents C_1-C_{20} -alkyl which is optionally substituted by halogen and which can be interrupted by oxygen or represents phenyl which is optionally substituted by halogen, C_1-C_{20} -halogenoalkyl or C_1-C_{20} -alkoxy, or represents benzyl which is optionally substituted by halogen, C_1-C_{20} -halogenoalkyl or C_1-C_{20} -alkoxy, or
20 represents C_2-C_8 -alkenyl or C_2-C_5 -alkinyl,

and the pure enantiomeric forms of compounds of the formula (I).

Particularly preferred compounds of the formula (I) are those in which

25 X represents C_1-C_4 -alkyl, halogen or C_1-C_4 -alkoxy,

Y represents hydrogen, C₁-C₆-alkyl, halogen, C₁-C₄-alkoxy or C₁-C₂-halogenoalkyl,

Z represents C₁-C₄-alkyl, halogen or C₁-C₄-alkoxy,

n represents a number from 0-3,

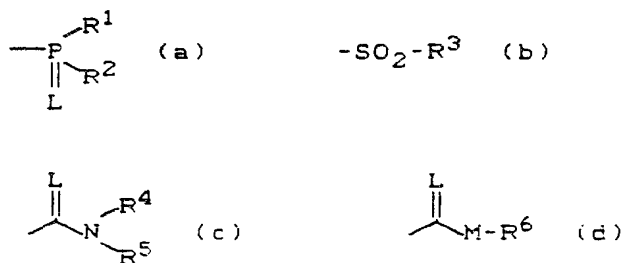
5 A represents hydrogen or in each case straight-chain or branched C₁-C₁₀-alkyl, C₃-C₆-alkenyl, C₃-C₆-alkinyl, C₁-C₆-alkoxy-C₂-C₆-alkyl, C₁-C₆-polyalkoxy-C₂-C₆-alkyl and C₁-C₆-alkylthio-C₂-C₆-alkyl, each of which is optionally substituted by halogen, or represents
10 cycloalkyl having 3-7 ring atoms which can be interrupted by 1-2 oxygen and/or sulphur atoms, or represents aryl, hetaryl or aryl-C₁-C₄-alkyl, each of which is optionally substituted by halogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy or nitro,

15 B represents hydrogen or in each case straight-chain or branched C₁-C₁₀-alkyl or C₁-C₆-alkoxyalkyl,

or in which

A and B together with the carbon atom to which they are bonded form a 3-to 7-membered saturated or unsaturated ring which can be substituted by C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₃-haloalkyl, C₁-C₃-haloalkoxy, fluorine, chlorine and substituted phenyl, and which
20 can be interrupted by oxygen and/or sulphur,

R represents the groups



in which

- 5 L and M in each case represent oxygen or sulphur and
L and M do not simultaneously represent oxygen,

10 R¹, R² and R³ independently of one another represent C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylamino, di-(C₁-C₆)-alkylamino, C₁-C₆-alkylthio, C₃-C₄-alkenylthio, C₂-C₄-alkinylthio and C₃-C₆-cycloalkylthio, each of which is optionally substituted by
15 halogen, or represent phenyl, benzyl, phenoxy or phenylthio, each of which is optionally substituted by fluorine, chlorine, bromine, nitro, cyano, C₁-C₃-alkoxy, C₁-C₃-halogenoalkoxy, C₁-C₃-alkylthio, C₁-C₃-halogenoalkylthio, C₁-C₃-alkyl or C₁-C₃-halogenoalkyl,

20 R⁴ and R⁵ independently of one another represent C₁-C₂₀-alkyl, C₁-C₂₀-alkoxy, C₂-C₈-alkenyl or C₁-C₂₀-alkoxy-C₁-C₂₀-alkyl, each of which is optionally substituted

by halogen, or represents phenyl which is optionally substituted by halogen, C₁-C₅-halogenoalkyl, C₁-C₅-alkyl or C₁-C₅-alkoxy, or represents benzyl which is optionally substituted by halogen, C₁-C₅-alkyl, C₁-C₅-halogenoalkyl or C₁-C₅-alkoxy,

5

R⁶ represents C₁-C₂₀-alkyl which is optionally substituted by halogen and which can be interrupted by oxygen or represents phenyl which is optionally substituted by halogen, C₁-C₅-halogenoalkyl or C₁-C₅-alkoxy, or represents benzyl which is optionally substituted by halogen, C₁-C₅-halogenoalkyl or C₁-C₅-alkoxy,

10

and the pure enantiomeric forms of compounds of the formula (I).

15 Very particularly preferred compounds of the formula (I) are those in which

X represents methyl, ethyl, propyl, i-propyl, fluorine, chlorine, bromine, methoxy and ethoxy,

Y represents hydrogen, methyl, ethyl, propyl, i-propyl, butyl, i-butyl, tert.-butyl, fluorine, chlorine, bromine, methoxy, ethoxy and trifluoromethyl,

20

Z represents methyl, ethyl, i-propyl, butyl, i-butyl, tert.-butyl, fluorine, chlorine, bromine, methoxy

and ethoxy,

n represents a number from 0-3,

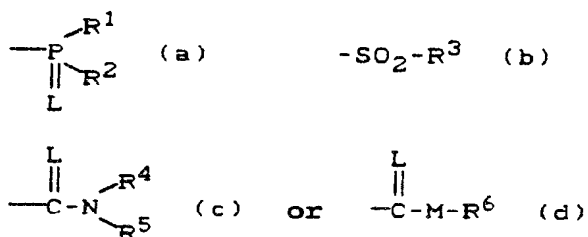
5 A represents hydrogen, or represents in each case
straight-chain or branched C₁-C₈-alkyl, C₃-C₄-alkenyl,
C₃-C₄-alkinyl, C₁-C₈-alkoxy-C₂-C₄-alkyl, C₁-C₄-
polyalkoxy-C₂-C₄-alkyl and C₁-C₈-alkylthio-C₂-C₄-alkyl,
each of which is optionally substituted by halogen,
or represents cycloalkyl which has 3-6 ring atoms
10 and which can be interrupted by 1-2 oxygen and/or
sulphur atoms, or represents aryl, pyridine, imida-
zole, pyrazole, triazole, indole, thiazole or aryl-
C₁-C₃-alkyl, each of which is optionally substituted
by fluorine , chlorine , bromine , methyl , ethyl ,
propyl , iso-propyl , methoxy , ethoxy , trifluoro-
15 methyl or nitro,

B represents hydrogen or in each case straight-chain
or branched C₁-C₈-alkyl or C₁-C₄-alkoxyalkyl,

or in which

20 A and B together with the carbon atom to which they are
bonded form a 3-to 6-membered saturated or unsatura-
ted ring which can be substituted by C₁-C₄-alkyl,
C₁-C₄-alkoxy, trifluoromethyl, trifluoromethoxy,
fluorine, chlorine and substituted phenyl and which
can be interrupted by oxygen and/or sulphur,

R represents the groups



in which

5 L and M in each case represent oxygen or sulphur and
L and M do not simultaneously represent oxygen,

10 R¹, R² and R³ independently of each other represent C₁-C₄-
alkyl, C₁-C₄-alkoxy, C₁-C₄-alkylamino, di-(C₁-C₄-
alkyl)amino or C₁-C₄-alkylthio, each of which
is optionally substituted by fluorine or
chlorine, or represent phenyl, benzyl, phenoxy
or phenylthio, each of which is optionally
15 substituted by fluorine, chlorine, bromine,
nitro, cyano, C₁-C₂-alkoxy, C₁-C₄-fluoroalkoxy,
C₁-C₂-chloroalkoxy, C₁-C₂-alkylthio, C₁-C₂-
fluoroalkylthio, C₁-C₂-chloroalkylthio or C₁-C₃-
alkyl,

20 R⁴ and R⁵ independently of each other represent C₁-C₁₀-
alkyl, C₁-C₁₀-alkoxy or C₁-C₁₀-alkoxy-(C₁-C₁₀)alkyl,
each of which is optionally substituted by fluorine,

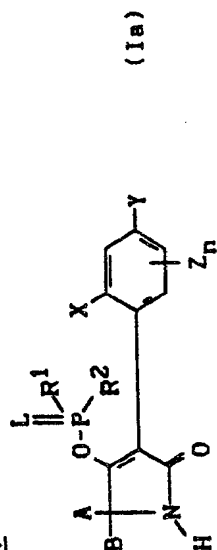
chlorine or bromine, or represents phenyl which is optionally substituted by fluorine, chlorine, bromine, C₁-C₂₀-halogenoalkyl, C₁-C₂₀-alkyl or C₁-C₄-alkoxy, or represents benzyl which is optionally substituted by fluorine, chlorine, bromine, C₁-C₄-alkyl, C₁-C₄-halogenoalkyl or C₁-C₄-alkoxy,

R⁶ represents C₁-C₁₀-alkyl which is optionally substituted by fluorine, chlorine or bromine and which can be interrupted by oxygen or represents phenyl which is optionally substituted by fluorine, chlorine, bromine, C₁-C₄-halogenoalkyl or C₁-C₄-alkoxy, or represents benzyl which is optionally substituted by fluorine, chlorine, bromine, C₁-C₄-halogenoalkyl or C₁-C₄-alkoxy,

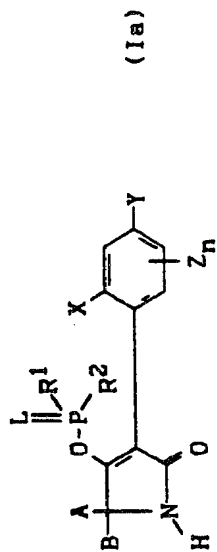
and the pure enantiomeric forms of compounds of the formula (I).

The following substituted 1 H-3-aryl-pyrrolidine-2,4-dione derivatives of the general formula (I) may be mentioned individually in addition to the compounds mentioned in the Preparation Examples:

Table 1:

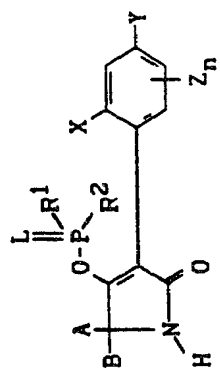


X	Y	Z _n	L	R ¹	R ²	A	B
CH ₃	CH ₃	6-CH ₃	S	OC ₂ H ₅	nC ₃ H ₇ S	CH ₃	H
CH ₃	CH ₃	6-CH ₃	O	N(CH ₃) ₂	N(CH ₃) ₂	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	CH ₃	SC ₂ H ₄ -CH(CH ₃) ₂	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OCH ₃	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₂ H ₅	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₃ H ₇ -i	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₄ H ₉ -sec	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₄ H ₉ -iso	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OCH ₃	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₃ H ₇ -i	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₄ H ₉ -sec	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₄ H ₉ -i	CH ₃	H



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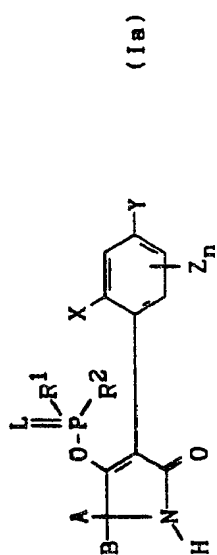
X	Y	Z _n	L	R ¹	R ²	A	B
CH ₃	CH ₃	6-CH ₃	S	OC ₂ H ₅	nC ₃ H ₇ S	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	O	N(CH ₃) ₂	N(CH ₃) ₂	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OCH ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₃ H ₇ -i	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₄ H ₉ -sec	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₄ H ₉ -iso	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OCH ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₃ H ₇ -i	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₄ H ₉ -sec	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₄ H ₉ -i	CH ₃	CH ₃



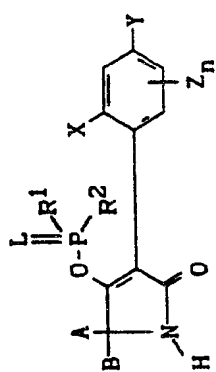
Le A 28 471

X	Y	Z _n	L	R ¹	R ²	A	B
CH ₃	CH ₃	6-CH ₃	S	OC ₂ H ₅	nC ₃ H ₇ S	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	N(CH ₃) ₂	N(CH ₃) ₂	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	CH ₃	SCH ₂ -CH(CH ₃) ₂	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OCH ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₃ H ₇ -i	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₄ H ₉ -sec	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	CH ₃	OC ₄ H ₉ -iso	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OCH ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₃ H ₇ -i	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₄ H ₉ -sec	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₄ H ₉ -i	-(CH ₂) ₅ -	-(CH ₂) ₅ -

1 23 1

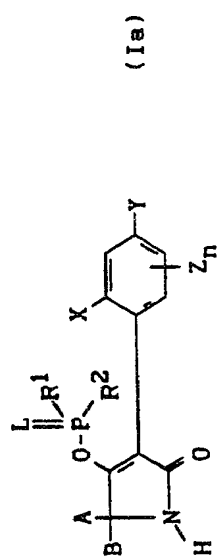


X	Y	Z _n	L	R ¹	R ²	A	B
CH ₃	CH ₃	6-CH ₃	S	OC ₂ H ₅	OC ₂ H ₅	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₂ H ₅	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	OC ₂ H ₅	OC ₂ H ₅	CH ₃	H
CH ₃	CH ₃	6-CH ₃	O	OC ₂ H ₅	SC ₃ H ₇ -i	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	OCH ₃	N(CH ₃) ₂	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	CH ₃	SCH(CH ₃)C ₂ H ₅	CH ₃	H
CH ₃	CH ₃	6-CH ₃	O	C ₂ H ₅ O	SCH(CH ₃)C ₂ H ₅	CH ₃	H

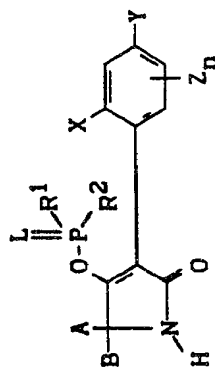


(Ia)

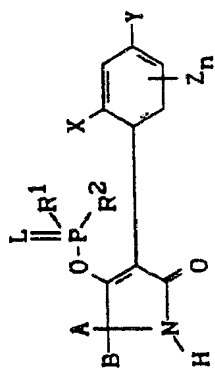
X	Y	Z _n	L	R ¹	R ²	A	B
CH ₃	CH ₃	6-CH ₃	S	OC ₂ H ₅	OC ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	OC ₂ H ₅	OC ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	O	OC ₂ H ₅	SC ₃ H ₇ -i	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	OCH ₃	N(CH ₃) ₂	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	CH ₃	SC(CH ₃)C ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	O	C ₂ H ₅ O	SC(CH ₃)C ₂ H ₅	CH ₃	CH ₃



X	Y	Z _n	L	R ¹	R ²	A	B
CH ₃	CH ₃	6-CH ₃	S	OC ₂ H ₅	OC ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	OC ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	OC ₂ H ₅	OC ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	OC ₂ H ₅	SC ₃ H ₇ -i	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	OCH ₃	N(CH ₃) ₂	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	CH ₃	SCH(CH ₃)C ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	C ₂ H ₅ O	SCH(CH ₃)C ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -



X	Y	Z _n	L	R ¹	R ²	A	B
CH ₃	CH ₃	6-CH ₃	0	CH ₃ O	SC ₃ H ₇ -i	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	n-C ₄ H ₉ O	SC ₃ H ₇ -i	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	CH ₃ O	SC ₄ H ₉ -sek	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	n-C ₄ H ₉	SC ₄ H ₉ -sek	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	CH ₃ O	SC ₃ H ₇ -i	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	n-C ₄ H ₉ O	SC ₃ H ₇ -i	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	CH ₃ O	SC ₄ H ₉ -sek	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	n-C ₄ H ₉	SC ₄ H ₉ -sek	CH ₃	CH ₃

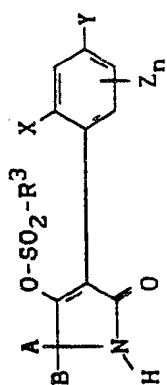


(Ia)

X	Y	Z _n	L	R ¹	R ²	A	B
CH ₃	CH ₃	6-CH ₃	O	CH ₃ O	SC ₃ H ₇ -i	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	n-C ₄ H ₉ O	SC ₃ H ₇ -i	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	CH ₃ O	SC ₄ H ₉ -sek	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	n-C ₄ H ₉	SC ₄ H ₉ -sek	-(CH ₂) ₅ -	-(CH ₂) ₅ -

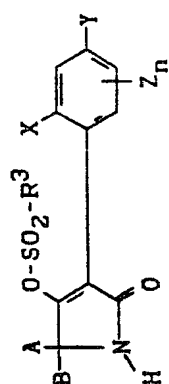
Table 2:

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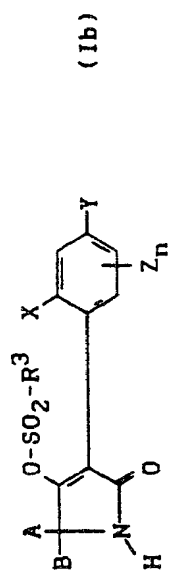


X	Y	Z _n	R ³	A	B
CH ₃	CH ₃	6-CH ₃	CH ₃	CH ₃	H
CH ₃	CH ₃	6-CH ₃	C ₄ F ₉	CH ₃	H
CH ₃	CH ₃	6-CH ₃	C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	6-CH ₃		CH ₃	H
CH ₃	CH ₃	6-CH ₃		CH ₃	H
CH ₃	CH ₃	6-CH ₃		CH ₃	H
CH ₃	CH ₃	6-CH ₃		CH ₃	H
CH ₃	CH ₃	6-CH ₃		CH ₃	H

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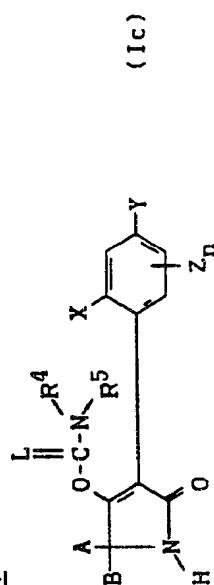
X	Y	Z _n	R ³	A	B
CH ₃	CH ₃	6-CH ₃	CH ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	C ₄ F ₉	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃		CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃		CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃		CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃		CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃		CH ₃	CH ₃

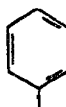


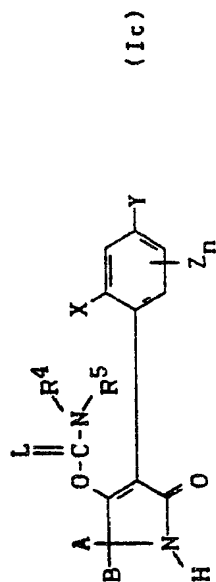
X	Y	Z _n	R ³	A	B
CH ₃	CH ₃	6-CH ₃	CH ₃	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	C ₄ F ₉	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	C ₄ H ₉	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃		-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃		-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃		-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃		-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃		-(CH ₂) ₅ -	

Table 3:


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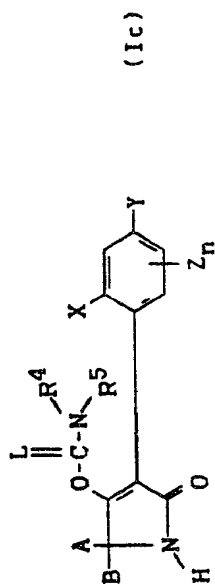
X	Y	Z _n	L	R ⁴	R ⁵	A	B
CH ₃	CH ₃	6-CH ₃	S	CH ₃	CH ₃	CH ₃	H
CH ₃	CH ₃	6-CH ₃	O	CH ₃	CH ₃	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	C ₂ H ₅	CH ₃	H
CH ₃	CH ₃	6-CH ₃	O	C ₂ H ₅	C ₂ H ₅	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	C ₃ H ₇ (n)	C ₃ H ₇ (n)	CH ₃	H
CH ₃	CH ₃	6-CH ₃	O	-CH ₂ -CH=CH ₂	-CH ₂ -CH=CH ₂	CH ₃	H
CH ₃	CH ₃	6-CH ₃	O	CH ₃		CH ₃	H
CH ₃	CH ₃	6-CH ₃	O	C ₃ H ₇ (n)	C ₃ H ₇ (n)	CH ₃	H
CH ₃	CH ₃	6-CH ₃	O	-(CH ₂) ₅ -		CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	-(CH ₂) ₂ -O-(CH ₂) ₂ -		CH ₃	H



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X	Y	Z _n	L	R ⁴	R ⁵	A	B
CH ₃	CH ₃	6-CH ₃	S	CH ₃	CH ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	O	CH ₃	CH ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	C ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	O	C ₂ H ₅	C ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	C ₃ H ₇ (n)	C ₃ H ₇ (n)	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	O	-CH ₂ -CH=CH ₂	-CH ₂ -CH=CH ₂	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	O	CH ₃		CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	O	C ₃ H ₇ (n)	C ₃ H ₇ (n)	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	O	-(CH ₂) ₅ -	-(CH ₂) ₅ -	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	-(CH ₂) ₂ -O-(CH ₂) ₂ -	-(CH ₂) ₂ -O-(CH ₂) ₂ -	CH ₃	CH ₃

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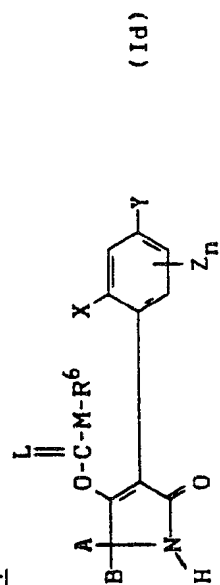

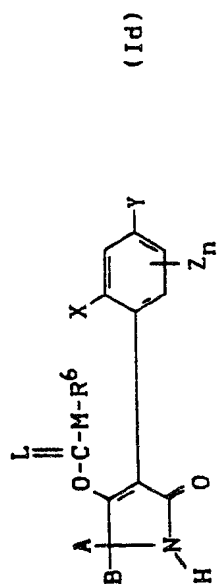
X	Y	Z _n	L	R ⁴	R ⁵	A	B
CH ₃	CH ₃	6-CH ₃	S	CH ₃	CH ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	CH ₃	CH ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	C ₂ H ₅	C ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	C ₂ H ₅	C ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	C ₃ H ₇ (n)	C ₃ H ₇ (n)	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	-CH ₂ -CH=CH ₂	-CH ₂ -CH=CH ₂	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	CH ₃		-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	C ₃ H ₇ (n)	C ₃ H ₇ (n)	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	O	-(CH ₂) ₂ -O-(CH ₂) ₂ -	-(CH ₂) ₂ -O-(CH ₂) ₂ -	-(CH ₂) ₅ -	-(CH ₂) ₅ -

Table 4:

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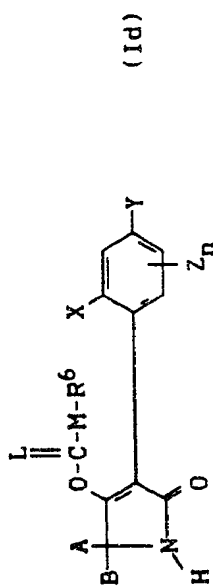


X	Y	Z _n	L	M	R ⁶	A	B
Cl	Cl	H	O	S	CH ₃	CH ₃	H
Cl	Cl	H	O	S	C ₂ H ₅	CH ₃	H
Cl	Cl	H	O	S	C ₃ H ₇	CH ₃	H
Cl	Cl	H	O	S	i-C ₃ H ₇	CH ₃	H
Cl	Cl	H	O	S	i-C ₄ H ₉	CH ₃	H
Cl	Cl	H	O	S	s-C ₄ H ₉	CH ₃	H
Cl	Cl	H	O	S	t-C ₄ H ₉	CH ₃	H
Cl	Cl	H	O	S	-CH ₂ -C(CH ₃) ₃	CH ₃	H
Cl	Cl	H	O	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	H
Cl	Cl	H	O	S	-CH ₂ -CH=CH ₂	CH ₃	H
Cl	Cl	H	O	S	-CH ₂ -C≡CH	CH ₃	H
Cl	Cl	H	O	S	-CH ₂ - 	CH ₃	H




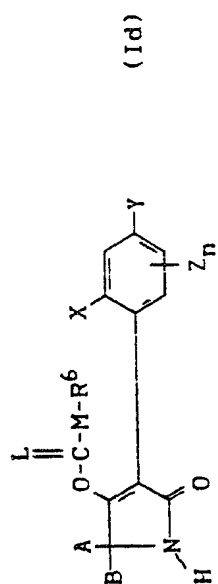
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X	Y	Z _n	L	M	R ⁶	A	B
Cl	Cl	H	O	S	CH ₃	CH ₃	CH ₃
Cl	Cl	H	O	S	C ₂ H ₅	CH ₃	CH ₃
Cl	Cl	H	O	S	C ₃ H ₇	CH ₃	CH ₃
Cl	Cl	H	O	S	i-C ₃ H ₇	CH ₃	CH ₃
Cl	Cl	H	O	S	i-C ₄ H ₉	CH ₃	CH ₃
Cl	Cl	H	O	S	n-C ₄ H ₉	CH ₃	CH ₃
Cl	Cl	H	O	S	t-C ₄ H ₉	CH ₃	CH ₃
Cl	Cl	H	O	S	-CH ₂ -C(CH ₃) ₃	CH ₃	CH ₃
Cl	Cl	H	O	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	CH ₃
Cl	Cl	H	O	S	-CH ₂ -CH=CH ₂	CH ₃	CH ₃
Cl	Cl	H	O	S	-CH ₂ -C≡CH	CH ₃	CH ₃
Cl	Cl	H	O	S	-CH ₂ -C ₆ H ₅	CH ₃	CH ₃

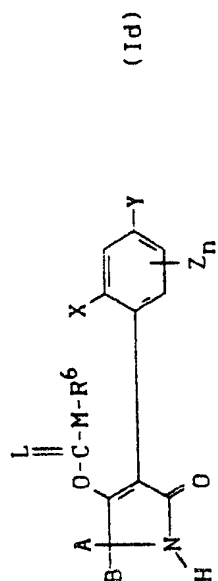


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X	Y	Z _n	L	M	R ⁶	A	B
Cl	Cl	H	O	S	CH ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	C ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	C ₃ H ₇	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	i-C ₃ H ₇	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	i-C ₄ H ₉	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	n-C ₄ H ₉	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	t-C ₄ H ₉	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	-CH ₂ -C(CH ₃) ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	-(CH ₂) ₂ -C(CH ₃) ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	-CH ₂ -CH=CH ₂	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	-CH ₂ -C≡CH	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	O	S	-CH ₂ - 	-(CH ₂) ₅ -	-(CH ₂) ₅ -

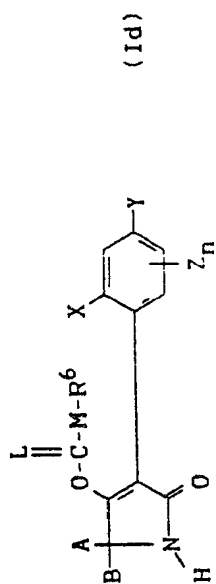


X	Y	Zn	L	M	R ⁶	A	B
CH ₃	CH ₃	H	O	S	CH ₃	CH ₃	H
CH ₃	CH ₃	H	O	S	C ₂ H ₅	CH ₃	H
CH ₃	CH ₃	H	O	S	C ₃ H ₇	CH ₃	H
CH ₃	CH ₃	H	O	S	i-C ₃ H ₇	CH ₃	H
CH ₃	CH ₃	H	O	S	i-C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	H	O	S	s-C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	H	O	S	t-C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	H	O	S	-CH ₂ -C(CH ₃) ₃	CH ₃	H
CH ₃	CH ₃	H	O	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	H
CH ₃	CH ₃	H	O	S	-CH ₂ -CH=CH ₂	CH ₃	H
CH ₃	CH ₃	H	O	S	-CH ₂ -C≡CH	CH ₃	H
CH ₃	CH ₃	H	O	S	-CH ₂ -C ₆ H ₅	CH ₃	H

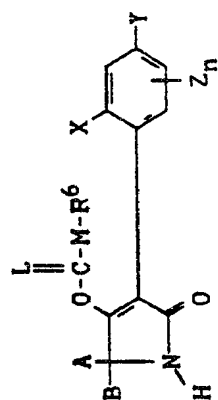


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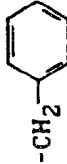
X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	H	O	S	CH ₃	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	C ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	C ₃ H ₇	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	i-C ₃ H ₇	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	i-C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	s-C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	t-C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	-CH ₂ -C(CH ₃) ₃	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	-CH ₂ -CH=CH ₂	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	-CH ₂ -C≡CH	CH ₃	CH ₃
CH ₃	CH ₃	H	O	S	-CH ₂ -C ₆ H ₅	CH ₃	CH ₃



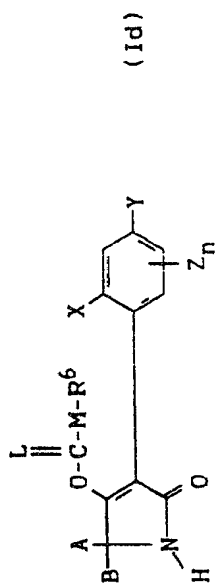
X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	H	O	S	CH ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	C ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	C ₃ H ₇	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	i-C ₃ H ₇	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	i-C ₄ H ₉	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	s-C ₄ H ₉	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	t-C ₄ H ₉	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	-CH ₂ -C(CH ₃) ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	-(CH ₂) ₂ -C(CH ₃) ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	-CH ₂ -CH=CH ₂	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	-CH ₂ -C≡CH	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	H	O	S	-CH ₂ -C ₆ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -



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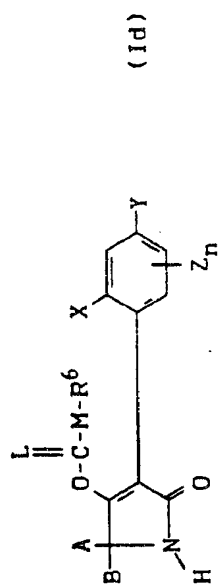
X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	6-CH ₃	0	S	CH ₃	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	S	C ₂ H ₅	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	S	C ₃ H ₇	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	S	i-C ₃ H ₇	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	S	i-C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	S	s-C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	S	t-C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	S	-CH ₂ -CH=CH ₂	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	S	-CH ₂ -C≡CH	CH ₃	H
CH ₃	CH ₃	6-CH ₃	0	S		CH ₃	H

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


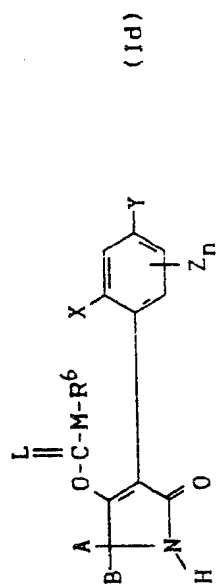
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
X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	6-CH ₃	0	S	CH ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	C ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	C ₃ H ₇	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	i-C ₃ H ₇	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	i-C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	s-C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	t-C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	-CH ₂ -C(CH ₃) ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	-CH ₂ -CH=CH ₂	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	-CH ₂ -C≡CH	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	0	S	-CH ₂ -C ₆ H ₅	CH ₃	CH ₃

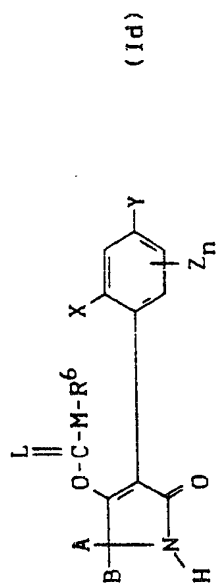



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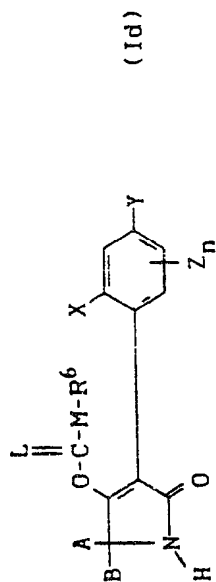
X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	6-CH ₃	0	S	CH ₃	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	C ₂ H ₅	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	C ₃ H ₇	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	i-C ₃ H ₇	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	i-C ₄ H ₉	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	s-C ₄ H ₉	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	l-C ₄ H ₉	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	-CH ₂ -C(CH ₃) ₃	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	-(CH ₂) ₂ -C(CH ₃) ₃	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	-CH ₂ -CH=CH ₂	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	-CH ₂ -C≡CH	-(CH ₂) ₅ -	
CH ₃	CH ₃	6-CH ₃	0	S	-CH ₂ - 	-(CH ₂) ₅ -	



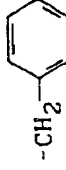
X	Y	Z _n	L	M	R ⁶	A	B
Cl	Cl	H	S	S	CH ₃	CH ₃	H
Cl	Cl	H	S	S	C ₂ H ₅	CH ₃	H
Cl	Cl	H	S	S	C ₃ H ₇	CH ₃	H
Cl	Cl	H	S	S	i-C ₃ H ₇	CH ₃	H
Cl	Cl	H	S	S	i-C ₄ H ₉	CH ₃	H
Cl	Cl	H	S	S	s-C ₄ H ₉	CH ₃	H
Cl	Cl	H	S	S	-CH ₂ -C(CH ₃) ₃	CH ₃	H
Cl	Cl	H	S	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	H
Cl	Cl	H	S	S	-CH ₂ -CH=CH ₂	CH ₃	H
Cl	Cl	H	S	S	-CH ₂ -C≡CH	CH ₃	H
Cl	Cl	H	S	S	 -CH ₂	CH ₃	H

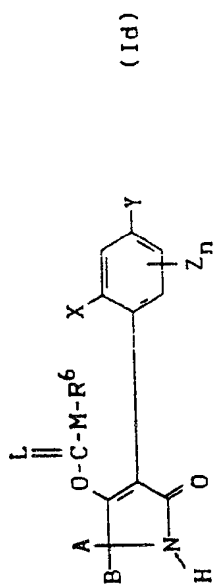


X	Y	Z _n	L	M	R ⁶	A	B
Cl	Cl	H	S	S	CH ₃	CH ₃	CH ₃
Cl	Cl	H	S	S	C ₂ H ₅	CH ₃	CH ₃
Cl	Cl	H	S	S	C ₃ H ₇	CH ₃	CH ₃
Cl	Cl	H	S	S	i-C ₃ H ₇	CH ₃	CH ₃
Cl	Cl	H	S	S	i-C ₄ H ₉	CH ₃	CH ₃
Cl	Cl	H	S	S	s-C ₄ H ₉	CH ₃	CH ₃
Cl	Cl	H	S	S	-CH ₂ -C(CH ₃) ₃	CH ₃	CH ₃
Cl	Cl	H	S	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	CH ₃
Cl	Cl	H	S	S	-CH ₂ -CH=CH ₂	CH ₃	CH ₃
Cl	Cl	H	S	S	-CH ₂ -C≡CH	CH ₃	CH ₃
Cl	Cl	H	S	S		CH ₃	CH ₃



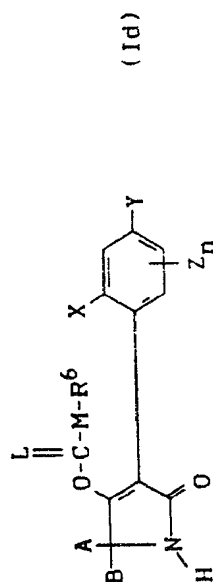
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X	Y	Z _n	L	M	R ⁶	A	B
Cl	Cl	H	S	S	CH ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	S	S	C ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	S	S	C ₃ H ₇	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	S	S	i-C ₃ H ₇	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	S	S	i-C ₄ H ₉	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	S	S	s-C ₄ H ₉	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	S	S	-CH ₂ -C(CH ₃) ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	S	S	-(CH ₂) ₂ -C(CH ₃) ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	S	S	-CH ₂ -CH=CH ₂	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	S	S	-CH ₂ -C≡CH	-(CH ₂) ₅ -	-(CH ₂) ₅ -
Cl	Cl	H	S	S		-(CH ₂) ₅ -	-(CH ₂) ₅ -



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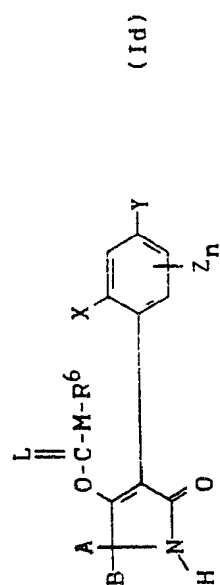
X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	H	S	S	CH ₃	CH ₃	H
CH ₃	CH ₃	H	S	S	C ₂ H ₅	CH ₃	H
CH ₃	CH ₃	H	S	S	C ₃ H ₇	CH ₃	H
CH ₃	CH ₃	H	S	S	i-C ₃ H ₇	CH ₃	H
CH ₃	CH ₃	H	S	S	i-C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	H	S	S	n-C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	H	S	S	-CH ₂ -C(CH ₃) ₃	CH ₃	H
CH ₃	CH ₃	H	S	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	H
CH ₃	CH ₃	H	S	S	-CH ₂ -CH=CH ₂	CH ₃	H
CH ₃	CH ₃	H	S	S	-CH ₂ -C≡CH	CH ₃	H
CH ₃	CH ₃	H	S	S	-CH ₂ -C ₆ H ₅	CH ₃	H




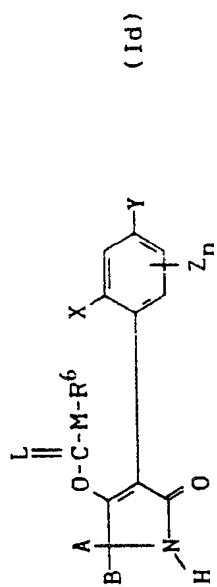
X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	H	S	S	CH ₃	CH ₃	CH ₃
CH ₃	CH ₃	H	S	S	C ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	H	S	S	C ₃ H ₇	CH ₃	CH ₃
CH ₃	CH ₃	H	S	S	i-C ₃ H ₇	CH ₃	CH ₃
CH ₃	CH ₃	H	S	S	i-C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	H	S	S	s-C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	H	S	S	-CH ₂ -C(CH ₃) ₃	CH ₃	CH ₃
CH ₃	CH ₃	H	S	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	CH ₃
CH ₃	CH ₃	H	S	S	-CH ₂ -CH=CH ₂	CH ₃	CH ₃
CH ₃	CH ₃	H	S	S	-CH ₂ -C≡CH	CH ₃	CH ₃
CH ₃	CH ₃	H	S	S	-CH ₂ -C ₆ H ₅	CH ₃	CH ₃

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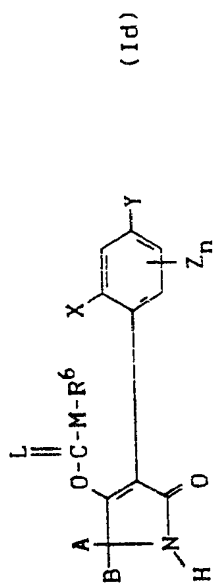
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X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	H	S	S	CH ₃	-	-(CH ₂) ₅ -
CH ₃	CH ₃	H	S	S	C ₂ H ₅	-	-(CH ₂) ₅ -
CH ₃	CH ₃	H	S	S	C ₃ H ₇	-	-(CH ₂) ₅ -
CH ₃	CH ₃	H	S	S	i-C ₃ H ₇	-	-(CH ₂) ₅ -
CH ₃	CH ₃	H	S	S	i-C ₄ H ₉	-	-(CH ₂) ₅ -
CH ₃	CH ₃	H	S	S	s-C ₄ H ₉	-	-(CH ₂) ₅ -
CH ₃	CH ₃	H	S	S	-CH ₂ -C(CH ₃) ₃	-	-(CH ₂) ₅ -
CH ₃	CH ₃	H	S	S	-(CH ₂) ₂ -C(CH ₃) ₃	-	-(CH ₂) ₅ -
CH ₃	CH ₃	H	S	S	-CH ₂ -CH=CH ₂	-	-(CH ₂) ₅ -
CH ₃	CH ₃	H	S	S	-CH ₂ -C≡CH	-	-(CH ₂) ₅ -
CH ₃	CH ₃	H	S	S	-CH ₂ - 	-	-(CH ₂) ₅ -

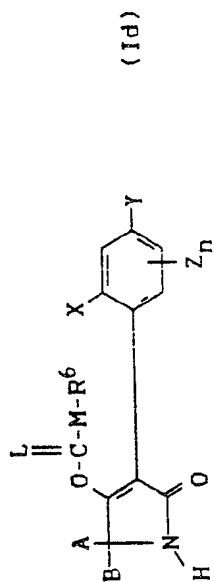



X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	6-CH ₃	S	S	CH ₃	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	S	C ₂ H ₅	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	S	C ₃ H ₇	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	S	i-C ₃ H ₇	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	S	i-C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	S	s-C ₄ H ₉	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -C(CH ₃) ₃	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -CH=CH ₂	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -C≡CH	CH ₃	H
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -C ₆ H ₅	CH ₃	H



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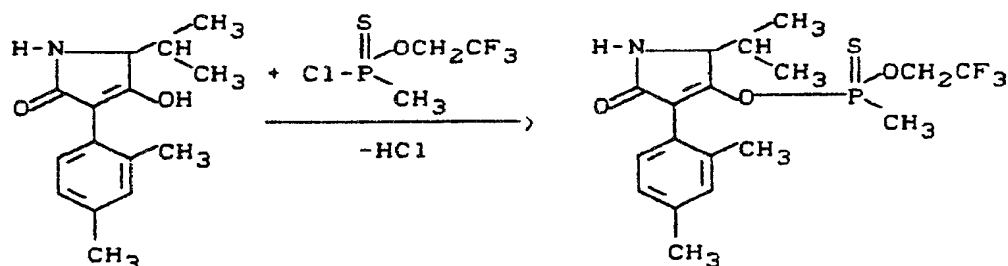
X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	6-CH ₃	S	S	CH ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	S	C ₂ H ₅	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	S	C ₃ H ₇	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	S	i-C ₃ H ₇	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	S	i-C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	S	5-C ₄ H ₉	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -C(CH ₃) ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	S	-(CH ₂) ₂ -C(CH ₃) ₃	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -CH=CH ₂	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -C≡CH	CH ₃	CH ₃
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -C ₆ H ₅	CH ₃	CH ₃



X	Y	Z _n	L	M	R ⁶	A	B
CH ₃	CH ₃	6-CH ₃	S	S	CH ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	S	C ₂ H ₅	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	S	C ₃ H ₇	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	S	i-C ₃ H ₇	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	S	i-C ₄ H ₉	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	S	s-C ₄ H ₉	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -C(CH ₃) ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	S	-(CH ₂) ₂ -C(CH ₃) ₃	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -CH=CH ₂	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	S	-CH ₂ -C≡CH	-(CH ₂) ₅ -	-(CH ₂) ₅ -
CH ₃	CH ₃	6-CH ₃	S	S		-(CH ₂) ₅ -	-(CH ₂) ₅ -

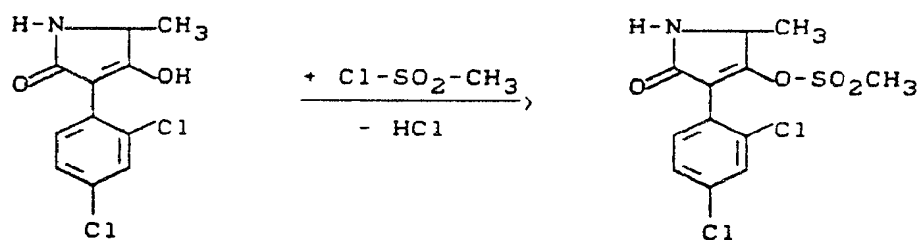
If, according to process (A), 3-(2,4-dimethylphenyl)-5-isopropyl-2,4-pyrrolidine-dione and 2,2,2-trifluoroethyl methanethiochlorophosphonate are used as starting materials, the course of the reaction can be represented by

5 the following reaction scheme:



If, according to process (B), 3-(2,4-dichlorophenyl)-5-methyl-2,4-pyrrolidine-dione and methanesulphonyl chloride are used as starting materials, the course of the reaction can be represented by the following reaction

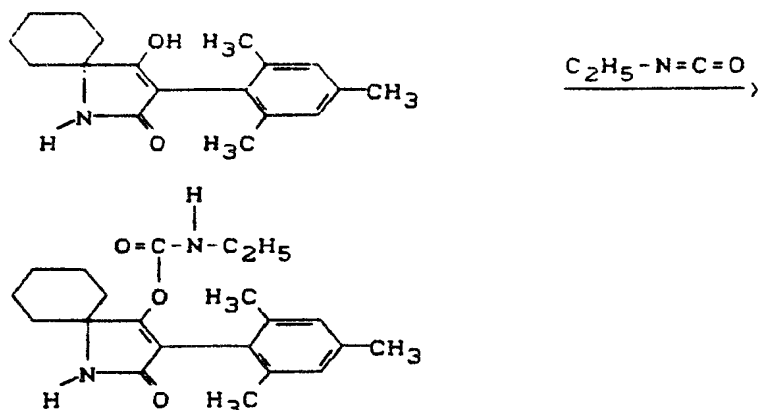
10 scheme:



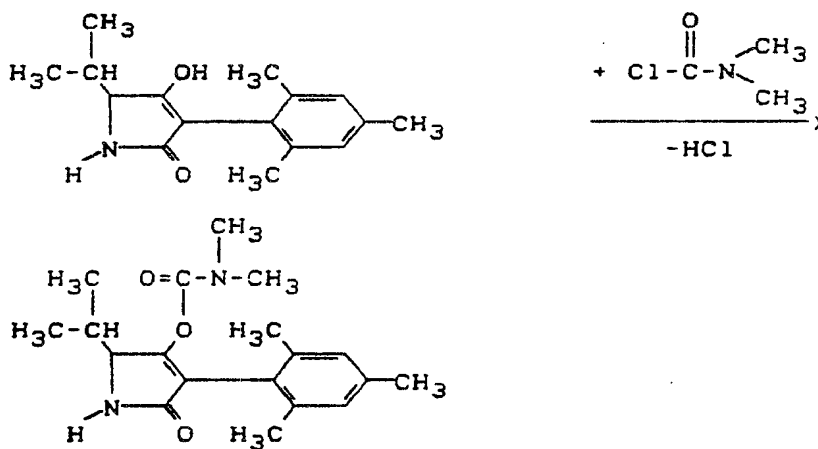
If, according to process (C_a), 3-(2,4,6-trimethylphenyl)-5,5-pentamethylene-2,4-pyrrolidine-dione and ethyl isocyanate are used as starting materials, the course of

15

the reaction can be represented by the following reaction scheme:

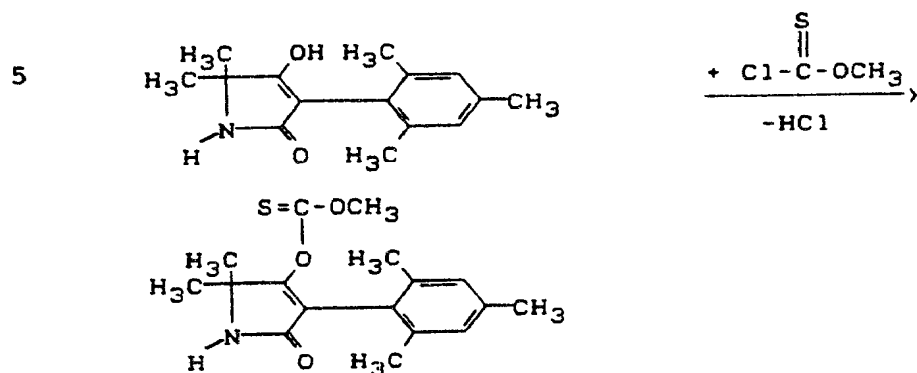


- 5 If, according to process (C₈), 3-(2,4,6-trimethylphenyl)-5-isopropyl-2,4-pyrrolidinedione and dimethylcarbamoyl chloride are used as starting materials, the course of the reaction can be represented as follows:

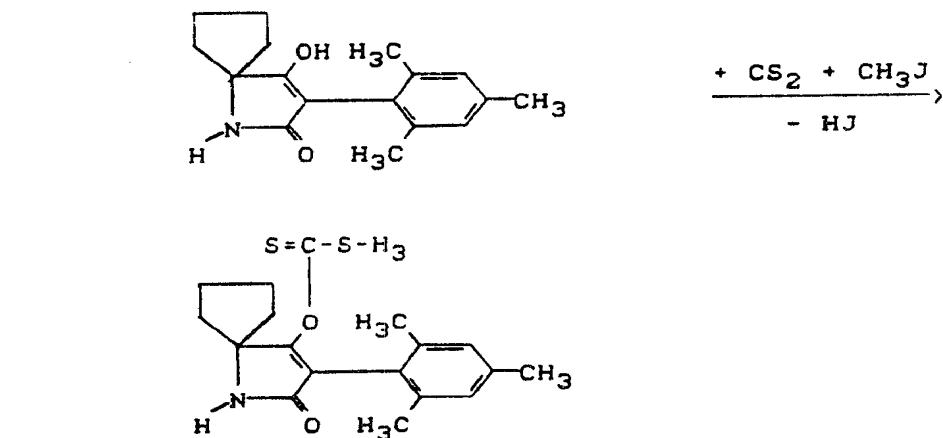


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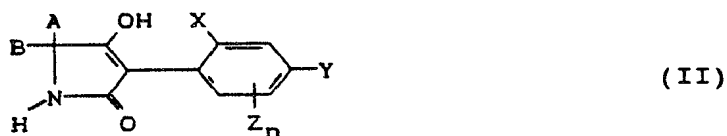
If, according to process (D_a), 3-(2,4,6-trimethylphenyl)-5,5-dimethyl-2,4-pyrrolidine-dione and methyl chloromonothioformate are used as starting materials, the course of the reaction can be represented as follows:



If, according to process (D_b), 3-(2,4,6-trimethylphenyl)-5,5-tetramethylene-2,4-pyrrolidine-dione, carbon disulphide and methyl iodide are used as starting components, the course of the reaction can be represented as follows:



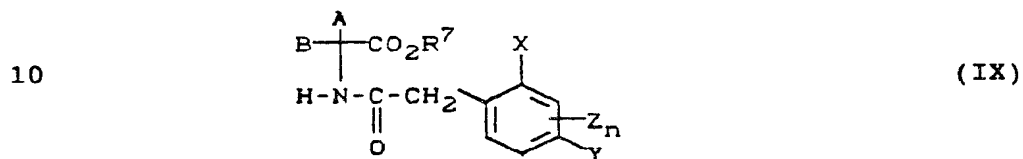
The compounds of the formula (II)



required as starting substances in the above process (A)-(D) in which

- 5 A, B, X, Y, Z and n have the abovementioned meaning, are new but the subject of earlier applications by the Applicant Company. For example, compounds of the formula (II) are obtained when

N-acylamino acid esters of the formula (IX)



in which

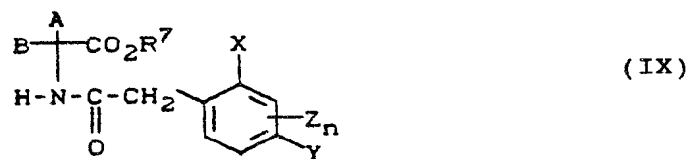
A, B, X, Y, Z and n have the abovementioned meaning

and

R⁷ represents alkyl,

- 15 are subjected to an intramolecular condensation reaction in the presence of a diluent and in the presence of a base.

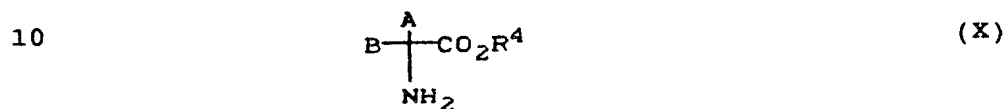
Some of the compounds of the formula (IX)



which are required as starting substances in the above process and in which

- 5 A, B, X, Y, Z, n and R⁷ have the abovementioned meaning, are known or can be prepared in a simple manner by methods known in principle. For example, acyl-amino acid esters of the formula (IX) are obtained when

a) amino acid esters of the formula (X)



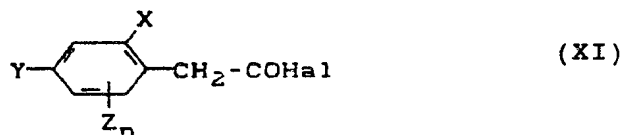
in which

R⁴ represents hydrogen (Xa) and alkyl (Xb)

and

A and B have the abovementioned meaning,

- 15 are acylated with phenylacetic acid halides of the formula (XI)

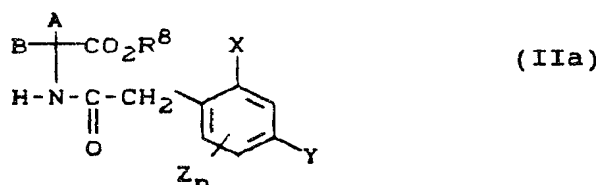


in which

X, Y, Z and n have the abovementioned meaning and

Hal represents chlorine or bromine (Chem. Reviews
52 237-416 (1953));

or when acylamino acids of the formula (IIa)



in which

A, B, X, Y, Z and n have the abovementioned meaning

and

R⁸ represents hydrogen,

are esterified (Chem. Ind. (London) 1568 (1968)).

Following preparation process (A), to obtain compounds of
the structure (Ia), 1 to 2, preferably 1 to 1.3, moles of

the phosphorus compound of the formula (III) are reacted at temperatures between -40 and 150°C, preferably between -10 and 110°C, per mole of the compound (II).

5 Suitable diluents which may be added are all inert, polar organic solvents such as halogenated hydrocarbons, ethers, amides, nitriles, alcohols, sulphides, sulphones, sulphoxides etc.

10 The following are preferably employed: acetonitrile, dimethyl sulphoxide, tetrahydrofuran, dimethylformamide and dimethyl sulphide.

15 Suitable acid-binding agents which may be added are customary inorganic or organic bases such as hydroxides or carbonates. Examples which may be listed are sodium hydroxide, sodium carbonate, potassium carbonate and pyridine..

20 The reaction can be carried out under atmospheric pressure or under increased pressure, it is preferably carried out under atmospheric pressure. Working-up is effected by customary methods of organic chemistry. The end products obtained are preferably purified by crystallisation, chromatographic purification or by so-called "incipient distillation", i.e. removal of the volatile components in vacuo.

25 Following preparation process (B), approx. 1 mole of sulphonyl chloride (IV) is reacted at 0 to 150°C, preferably

20 to 70°C, per mole of starting compound of the formula (II).

5 Suitable diluents which may be added are all inert polar organic solvents such as halogenated hydrocarbons, ethers, amides, nitriles, alcohols, sulphones and sulphoxides.

The following are preferably employed: methylene chloride, dimethyl sulphoxide, tetrahydrofuran, dimethylformamide and dimethyl sulphide.

10 If the enolate salt of the compound II is synthesised in a preferred embodiment by adding strong deprotonating agents (such as, for example, sodium hydride or potassium tertiary butylate), a further addition of acid-binding agents can be dispensed with.

15 If acid-binding agents are employed, then those which are suitable are customary inorganic or organic bases, examples which may be mentioned being sodium hydroxide, sodium carbonate, potassium carbonate and pyridine.

20 The reaction can be carried out under atmospheric pressure or under increased pressure, it is preferably carried out under atmospheric pressure. Working-up is carried out by customary methods.

If appropriate, the process following preparation process (B) can be carried out under phase-transfer conditions

(W.J. Spillane et al., J. Chem. Soc. Perkin Trans I, (3) 677-9 (1982)). In this case, 0.3 to 1.5 moles of sulphonyl chloride (IV), preferably 0.5 mole, are reacted at 0 to 150°C, preferably 20 to 70°C, per mole of starting compound of the formula (II). Examples of phase-transfer catalysts which can be used are all quaternary ammonium salts, preferably tetraoctylammonium bromide and benzyltriethylammonium chloride. Organic solvents which can be used in this case are all unpolar inert solvents, benzene and toluene are preferably employed.

Following preparation process (C_a), approx. 1 mole of isocyanate of the formula (V) is reacted at 0 to 100°C, preferably at 20 to 50°C, per mole of starting compound of the formula (II).

Suitable diluents which may be added are all inert organic solvents such as ethers, amides, nitriles, sulphones or sulphoxides.

If appropriate, catalysts can be added to accelerate the reaction. Catalysts which are very advantageously employed are organotin compounds such as, for example, dibutyltin dilaurate. The process is preferably carried out under atmospheric pressure.

Following preparation process (C_b), approx. 1 mole of carbamoyl chloride or thiocarbamoyl chloride of the formula (VI) is reacted at 0 to 150°C, preferably at 20 to 70°C, per mole of starting compound of the formula (II).

Suitable diluents which may be added are all inert polar organic solvents such as ethers, amides, alcohols, sulphones and sulfoxides.

5 The following are preferably employed: dimethyl sulfoxide, tetrahydrofuran, dimethylformamide and dimethyl sulphide.

10 If the enolate salt of the compound II is synthesised in a preferred embodiment by adding strong deprotonating agents (such as, for example, sodium hydride or potassium tertiary butylate), a further addition of acid-binding agents can be dispensed with.

15 If acid-binding agents are employed, then those which are suitable are customary inorganic or organic bases, examples which may be mentioned being sodium hydroxide, sodium carbonate, potassium carbonate and pyridine.

The reaction can be carried out under atmospheric pressure or under increased pressure, it is preferably carried out under atmospheric pressure. Working-up is carried out by customary methods.

20 Following preparation process (D_a), approx. 1 mole of chloromonothioformic ester or chlorodithioformic ester of the formula (VII) is reacted at 0 to 120°C, preferably at 20 to 60°C, per mole of starting compound of the formula (II).

Suitable diluents which may be added are all inert organic solvents such as halogenated hydrocarbons, ethers, amides, alcohols, sulphones and sulphoxides.

5 The following are preferably employed: methylene chloride, dimethyl sulphoxide, tetrahydrofuran, dimethyl-formamide and dimethyl sulphide.

10 If the enolate salt of the compound II is synthesised in a preferred embodiment by adding strong deprotonating agents (such as, for example, sodium hydride or potassium tertiary butylate), a further addition of acid-binding agents can be dispensed with.

15 If acid-binding agents are employed, then those which are suitable are customary inorganic or organic bases, examples which may be mentioned being sodium hydroxide, sodium carbonate, potassium carbonate and pyridine.

The reaction can be carried out under atmospheric pressure or under increased pressure, it is preferably carried out under atmospheric pressure. Working-up is effected by customary methods.

20 Following preparation process (D_B), the equimolar amount, or an excess, of carbon disulphide is added per mole of starting compound of the formula (II). This process is preferably carried out at temperatures from 0 to 50°C and, in particular, at 20 to 30°C.

5 It is frequently expedient to first prepare the corresponding salt from the compound of the formula (II) by adding a deprotonating agent (such as, for example, potassium tertiary butylate or sodium hydride). The compound (II) is reacted with carbon disulphide until the formation of the intermediate is complete, for example stirring at room temperature for several hours.

10 The further reaction with the alkyl halide of the formula (VIII) is preferably effected at 0 to 70°C and, in particular, at 20 to 50°C. At least the equimolar amount of alkyl halide is employed in this process.

The process is carried out under atmospheric pressure or under increased pressure, preferably under atmospheric pressure.

15 Again, working-up is effected by customary methods.

20 The active compounds are suitable for combating animal pests, preferably arthropods and nematodes, in particular insects and arachnids, encountered in agriculture, in forestry, in the protection of stored products and of materials, and in the hygiene field. They are active against normally sensitive and resistant species and against all or some stages of development. The above-mentioned pests include:

25 From the order of the Isopoda, for example, *Oniscus asellus*, *Armadillidium vulgare* and *Porcellio scaber*. From

the order of the Diplopoda, for example, *Blaniulus guttulatus*. From the order of the Chilopoda, for example, *Geophilus carpophagus* and *Scutigera spec.* From the order of the Symphyla, for example, *Scutigerella immaculata*.
 5 From the order of the Thysanura, for example, *Lepisma saccharina*. From the order of the Collembola, for example, *Onychiurus armatus*. From the order of the Orthoptera, for example, *Blatta orientalis*, *Periplaneta americana*, *Leucophaea maderae*, *Blattella germanica*,
 10 *Acheta domesticus*, *Gryllotalpa* spp., *Locusta migratoria migratorioides*, *Melanoplus differentialis* and *Schistocerca gregaria*. From the order of the Dermaptera, for example, *Forficula auricularia*.

From the order of the Isoptera, for example,
 15 *Reticulitermes* spp.. From the order of the Anoplura, for example, *Phylloxera vastatrix*, *Pemphigus* spp., *Pediculus humanus corporis*, *Haematopinus* spp. and *Linognathus* spp.

From the order of the Mallophaga, for example, *Trichodectes* spp. and *Damalinae* spp. From the order of
 20 the Thysanoptera, for example, *Hercinothrips femoralis* and *Thrips tabaci*. From the order of the Heteroptera, for example, *Eurygaster* spp., *Dysdercus intermedius*, *Piesma quadrata*, *Cimex lectularius*, *Rhodnius prolixus* and *Triatoma* spp.

25 From the order of the Homoptera, for example, *Aleurodes brassicae*, *Bemisia tabaci*, *Trialeurodes vaporariorum*, *Aphis gossypii*, *Brevicoryne brassicae*, *Cryptomyzus ribis*,

Aphis fabae, Doralis pomi, Eriosoma lanigerum,
 Hyalopterus arundinis, Macrosiphum avenae, Myzus spp.,
 Phorodon humuli, Rhopalosiphum padi, Empoasca spp.,
 Euscelis bilobatus, Nephotettix cincticeps, Lecanium
 5 corni, Saissetia oleae, Laodelphax striatellus,
 Nilaparvata lugens, Aonidiella aurantii, Aspidiotus
 hederae, Pseudococcus spp. and Psylla spp. From the order
 of the Lepidoptera, for example, Pectinophora gossy-
 piella, Bupalus piniarius, Cheimantobia brumata, Lithocol-
 10 letis blancardella, Hyponomeuta padella, Plutella maculi-
 pennis, Malacosoma neustria, Euproctis chrysorrhoea,
 Lymantria spp., Bucculatrix thurberiella, Phyllocnistis
 citrella, Agrotis spp., Euxoa spp., Feltia spp., Earias
 insulana, Heliothis spp., Spodoptera exigua, Mamestra
 15 brassicae, Panolis flammea, Prodenia litura, Spodoptera
 spp., Trichoplusia ni, Carpocapsa pomonella, Pieris spp.,
 Chilo spp., Pyrausta nubilalis, Ephestia kuehniella,
 Galleria mellonella, Tineola bisselliella, Tinea pellio-
 nella, Hofmannophila pseudospretella, Cacoecia podana,
 20 Capua reticulana, Choristoneura fumiferana, Clysia
 ambiguella, Homona magnanima and Tortrix viridana.

From the order of the Coleoptera, for example, Anobium
 punctatum, Rhizopertha dominica, Acanthoscelides
 obtectus, Hylotrupes bajulus,
 25 Agelastica aini, Leptinotarsa decemlineata, Phaedon
 cochleariae, Diabrotica spp., Psylliodes chrysocephala,
 Epilachna varivestis Atomaria spp., Oryzaephilus
 surinamensis, Anthonomus spp., Sitophilus spp.,
 Otiorrhynchus sulcatus, Cosmopolites sordidus,

Ceuthorrhynchus assimilis, Hypera postica, Dermestes
 spp., Trogoderma spp., Anthrenus spp., Attagenus spp.,
 Lyctus spp., Meligethes aeneus, Ptinus spp., Niptus
 hololeucus, Gibbium psyllodes, Tribolium spp., Tenebrio
 5 molitor, Agriotes spp., Conoderus spp., Melolontha
 melolontha, Amphimallon solstitialis and Costelytra
 zealandica. From the order of the Hymenoptera, for
 example, Diprion spp., Hoplocampa spp., Lasius spp.,
 Monomorium pharaonis and Vespa spp. From the order of the
 10 Diptera, for example, Aedes spp., Anopheles spp., Culex
 spp., Drosophila melanogaster, Musca spp., Fannia spp.,
 Calliphora erythrocephala, Lucilia spp., Chrysomyia spp.,
 Cuterebra spp., Gastrophilus spp., Hyppobosca spp.,
 Stomoxys spp., Oestrus spp., Hypoderma spp., Tabanus
 15 spp., Tannia spp., Bibio hortulanus, Oscinella frit,
 Phorbia spp., Pegomyia hyoscyami, Ceratitis capitata,
 Dacus oleae and Tipula paludosa.

From the order of the Siphonaptera, for example,
 Xenopsylla cheopis and Ceratophyllus spp. From the order
 20 of the Arachnida, for example, Scorpio maurus and
 Latrodectus mactans.

From the order of the Acarina, for example, Acarus siro,
 Argas spp., Ornithodoros spp., Dermanyssus gallinae,
 Eriophyes ribis, Phyllocoptiruta oleivora, Boophilus spp.,
 25 Rhipicephalus spp., Amblyomma spp., Hyalomma spp., Ixodes
 spp., Psoroptes spp., Chorioptes spp., Sarcoptes spp.,
 Tarsonemus spp., Bryobia praetiosa, Panonychus spp.,
 Tetranychus spp..

The active compounds according to the invention are distinguished by a high insecticidal and acaricidal activity.

5 They can be employed particularly successfully against insects which are harmful to plants, such as, for example, against the larvae of the mustard beetle (*Phaedon cochleariae*) or against the larvae of the green rice cicada (*Nephotettix cinciteps*) or against mites which are harmful to plants such as, for example, against
10 the common spider mite or the greenhouse red spider mite (*Tetranychus urticae*).

The active compounds according to the invention are not only active against plant, hygiene and stored product pests, but also, in the veterinary medicine sector,
15 against animal parasites (ectoparasites and endoparasites) such as scaly ticks, argasidae, scab mites, trombididae, flies (biting and sucking), parasitic fly larvae, lice, hair lice, bird lice, fleas and endoparasitically living worms.

20 They are active against normally-sensitive and resistant species and strains and against all parasitising and non-parasitising development stages of the ecto- and endoparasites.

25 The active compounds according to the invention can furthermore be used as defoliants, desiccants, agents for destroying broad-leaved plants and, especially, as weed-

killers. By weeds, in the broadest sense, there are to be understood all plants which grow in locations where they are undesired. Whether the substances according to the invention act as total or selective herbicides depends essentially on the amount used.

The active compounds according to the invention can be used, for example, in connection with the following plants:

Dicotyledon weeds of the genera: Sinapis, Lepidium, Galium, Stellaria, Matricaria, Anthemis, Galinsoga, Chenopodium, Urtica, Senecio, Amaranthus, Portulaca, Xanthium, Convolvulus, Ipomoea, Polygonum, Sesbania, Ambrosia, Cirsium, Carduus, Sonchus, Solanum, Rorippa, Rotala, Lindernia, Lamium, Veronica, Abutilon, Emex, Datura, Viola, Galeopsis, Papaver, Centaurea, Trifolium, Ranunculus and Taraxacum.

Dicotyledon cultures of the genera: Gossypium, Glycine, Beta, Daucus, Phaseolus, Pisum, Solanum, Linum, Ipomoea, Vicia, Nicotiana, Lycopersicon, Arachis, Brassica, Lactuca, Cucumis and Cucurbita.

Monocotyledon weeds of the genera: Echinochloa, Setaria, Panicum, Digitaria, Phleum, Poa, Festuca, Eleusine, Brachiaria, Lolium, Bromus, Avena, Cyperus, Sorghum, Agropyron, Cynodon, Monochoria, Fimbristylis, Sagittaria, Eleocharis, Scirpus, Paspalum, Ischaemum, Sphenoclea, Dactyloctenium, Agrostis, Alopecurus and Apera.

Monocotyledon cultures of the genera: Oryza, Zea, Triticum, Hordeum, Avena, Secale, Sorghum, Panicum, Saccharum, Ananas, Asparagus and Allium.

5 However, the use of the active compounds according to the invention is in no way restricted to these genera, but also extends in the same manner to other plants.

10 The compounds are suitable, depending on the concentration, for the total combating of weeds, for example on industrial terrain and rail tracks, and on paths and squares with or without tree plantings. Equally, the compounds can be employed for combating weeds in perennial cultures, for example afforestations, decorative tree plantings, orchards, vineyards, citrus groves, nut orchards, banana plantations, coffee plantations, tea
15 plantations, rubber plantations, oil palm plantations, cocoa plantations, soft fruit plantings and hopfields, on lawns, turf and pasture-land, and for the selective combating of weeds in annual cultures.

20 The active compounds can be converted into the customary formulations, such as solutions, emulsions, wettable powders, suspensions, powders, dusting agents, pastes, soluble powders, granules, suspension-emulsion concentrates, natural and synthetic materials impregnated with active compound, and very fine capsules in polymeric
25 substances.

These formulations are produced in a known manner, for

example by mixing the active compounds with extenders, that is liquid solvents and/or solid carriers, optionally with the use of surface-active agents, that is emulsifying agents and/or dispersing agents and/or foam-forming agents.

In the case of the use of water as an extender, organic solvents can, for example, also be used as auxiliary solvents. As liquid solvents, there are suitable in the main: aromatics, such as xylene, toluene or alkyl-naphthalenes, chlorinated aromatics and chlorinated aliphatic hydrocarbons, such as chlorobenzenes, chloroethylenes or methylene chloride, aliphatic hydrocarbons, such as cyclohexane or paraffins, for example petroleum fractions, mineral and vegetable oils, alcohols, such as butanol or glycol as well as their ethers and esters, ketones, such as acetone, methyl ethyl ketone, methyl isobutyl ketone or cyclohexanone, strongly polar solvents, such as dimethylformamide and dimethyl sulphoxide, as well as water.

As solid carriers there are suitable: for example ammonium salts and ground natural minerals, such as kaolins, clays, talc, chalk, quartz, attapulgite, montmorillonite or diatomaceous earth, and ground synthetic minerals, such as highly disperse silica, alumina and silicates, as solid carriers for granules there are suitable: for example crushed and fractionated natural rocks such as calcite, marble, pumice, sepiolite and dolomite, as well as synthetic granules of inorganic and organic meals, and

granules of organic material such as sawdust, coconut shells, maize cobs and tobacco stalks; as emulsifying and/or foam-forming agents there are suitable: for example non-ionogenic and anionic emulsifiers, such as
5 polyoxyethylene fatty acid esters, polyoxyethylene fatty alcohol ethers, for example alkylaryl polyglycol ethers, alkylsulphonates, alkyl sulphates, arylsulphonates as well as albumen hydrolysis products; as dispersing agents there are suitable: for example lignin-sulphite waste
10 liquors and methylcellulose.

Adhesives such as carboxymethylcellulose and natural and synthetic polymers in the form of powders, granules or latexes, such as gum arabic, polyvinyl alcohol and polyvinyl acetate, as well as natural phospholipids, such
15 as cephalins and lecithins, and synthetic phospholipids, can be used in the formulations. Further additives can be mineral and vegetable oils.

It is possible to use colorants such as inorganic pigments, for example iron oxide, titanium oxide and Prussian Blue, and organic dyestuffs, such as alizarin
20 dyestuffs, azo dyestuffs and metal phthalocyanine dyestuffs, and trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

The formulations in general contain between 0.1 and 95 %
25 by weight of active compound, preferably between 0.5 and 90%.

For combating weeds, the active compounds according to the invention, as such or in the form of their formulations, can also be used as mixtures with known herbicides, finished formulations or tank mixes being possible.

5

Mixtures with other known active compounds, such as fungicides, insecticides, acaricides, nematocides, bird repellants, plant nutrients and agents which improve soil structure, are also possible.

10 The active compounds can be used as such, in the form of their formulations or in the use forms prepared therefrom by further dilution, such as ready-to-use solutions, suspensions, emulsions, powders, pastes and granules. They are used in the customary manner, for example by

15

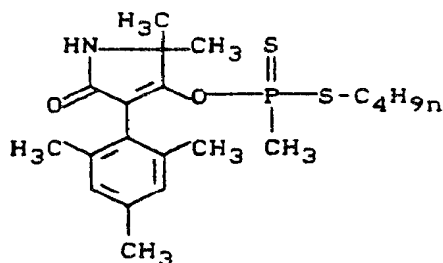
The active compounds according to the invention can be applied either before or after emergence of the plants. They can also be incorporated into the soil before sowing.

20

The amount of active compound used can vary within a substantial range. It depends essentially on the nature of the desired effect. In general, the amounts used are between 0.01 and 10 kg of active compound per hectare of soil surface, preferably between 0.05 and 5 kg per ha.

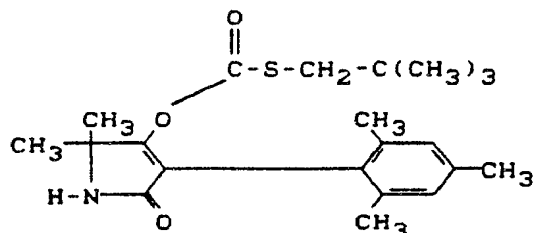
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The preparation and use of the active compounds according to the invention can be seen from the following examples.

Preparation Examples:Example 1

4 g (16.3 mmol) of 3-(2,4,6-trimethylphenyl)-5,5-dimethylpyrrolidine-2,4-dione are dissolved in 10 ml of tetrahydrofuran. To this solution there are added 2.5 ml (18 mmol) of triethylamine and then, at room temperature, 3.6 g (17.8 mmol) of S-(n-butyl) methane-chlorodithiophosphonate. The batch is stirred at 50°C for approx. two hours, and the end of the reaction is monitored chromatographically. After the solvent has been distilled off, the residue which remains is purified via a silica gel frit (mobile phase toluene:ethyl acetate 8:2).

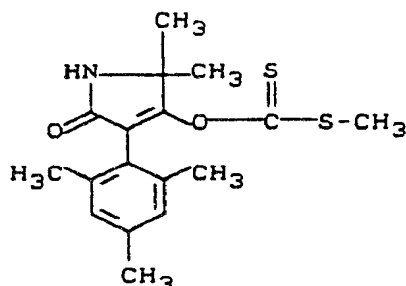
1.6 g (29.2% of theory) of O-[3-(2,4,6-trimethylphenyl)-5,5-dimethylpyrrolidin-2-on-] S-(n-butyl) methane-dithiophosphonate of melting point 98°C are obtained.



3.68 g (15 mmol) of 3-(2,4,6-trimethylphenyl)-5,5-dimethylpyrrolidine-2,4-dione are introduced into 60 ml of absolute methylene chloride. To this mixture there are added dropwise 2.3 ml (16.5 mmol) of triethylamine and then, at 0 to 10°C, 2.75 g (16.5 mmol) of S-(2,2-dimethylpropyl) chlorothiocarbonate, dissolved in 15 ml of absolute methylene chloride. The batch is stirred at room temperature for approx. 2 hours and the end of the reaction is monitored chromatographically. The reaction mixture is washed in succession with 10% strength citric acid, sodium hydrogen carbonate solution and sodium chloride solution, the organic phase is dried, and the solvent is distilled off. After recrystallisation from ethyl acetate/hexane 1:4, 2.74 g (49% of theory) of S-(2,2-dimethylpropyl) O-[3-(2,4,6-trimethylphenyl)-5,5-dimethylpyrrolidin-2-one] thiocarbonate of melting point 197-200°C are obtained.

Example 3

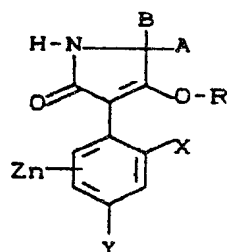
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4.91 g (20 mmol) of 3-(2,4,6-trimethylphenyl)-5,5-dimethylpyrrolidine-2,4-dione are dissolved in 40 ml of anhydrous dimethylformamide. To this solution there are added 1.08 g of sodium methanolate, and stirring of the batch is continued for approx. 10 minutes. After an addition of 1.17 ml of carbon disulphide, the mixture is stirred for 3 hours at room temperature, and 1.24 ml of methyl iodide are subsequently added dropwise. The reaction batch is stirred at room temperature for another 3 hours, and the end of the reaction is monitored chromatographically. The reaction mixture is stirred into 120 ml of water, the precipitate is filtered off with suction, the filtrate is taken up in dichloromethane, and the mixture is washed with 200 ml of 0.5 N sodium hydroxide solution. The organic phase is dried over magnesium sulphate and concentrated. 10 ml of ethyl acetate are used for making the crude product obtained into a paste under hot conditions, and the mixture is filtered off with suction. 2.1 g (31.3% of theory) of S-methyl O-[3-(2,4,6-trimethylphenyl)-5,5-dimethylpyrrolidin-2-one] thiocarbonate of melting point 214-215°C are obtained.

5

The end products of the formula (I) listed in Table 5 below are obtained in a manner analogous to that of Examples 1, 2 and 3 and having regard to the details in the description relating to the processes according to the invention.



(I)

Table 5


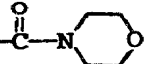
Ex. No.	A	B	X	Y	Zn	R	physical const.
4	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{S}-(\text{CH}_2)_2-\text{C}(\text{CH}_3)_3 \end{array}$	m.p.: 211° C
5	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{S} \\ \parallel \\ -\text{P}-\text{S}-\text{C}_4\text{H}_9 \\ \\ \text{CH}_3 \end{array}$	m.p.: 104° C
6	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	-SO ₂ -CH ₃	m.p.: 194-195° C
7	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	-SO ₂ - 	m.p. 217-218 °C
8	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	-SO ₂ -C ₃ H ₇ iso	m.p.: 187-193 °C
9	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{N} \end{array}$ 	m.p.: 96-105 °C
10	-(CH ₂) ₅ -		CH ₃	CH ₃	6-CH ₃	-SO ₂ -CH ₃	m.p. 201-206 °C

Table 5 - continuation

	Ex. No.	A	B	X	Y	Z _n	R	physical const.
5	11	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{SC}_3\text{H}_7 \text{ iso} \end{array}$	m.p. 180-186 °C
	12	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{SC}_4\text{H}_9 \text{ tert.} \end{array}$	m.p. 184-188 °C
10	13	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{SCH}_2\text{CH}_2-\text{CH}(\text{CH}_3)_2 \end{array}$	m.p. 132-135 °C
	14	-(CH ₂) ₅ -	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{SC}_3\text{H}_7 \text{ iso} \end{array}$	m.p. 193-196 °C
	15	-(CH ₂) ₅ -	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{SCH}_2-\text{C}(\text{CH}_3)_3 \end{array}$	m.p. 252-260 °C
15	16	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} -\text{C}-\text{SCH}-\text{CH}_2-\text{CH}-\text{CH}_3 \\ \quad \quad \quad \mid \quad \quad \quad \mid \\ \quad \quad \quad \text{CH}_3 \quad \quad \quad \text{CH}_3 \end{array}$	m.p. 126-128 °C
20	17	C ₃ H ₇ iso	H	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{S}-\text{CH}_2-\text{C}(\text{CH}_3)_3 \end{array}$	m.p. 138-139 °C
	18	C ₃ H ₇ iso	H	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{S}-\text{CH}_2-\text{CH}_2-\text{C}(\text{CH}_3)_3 \end{array}$	m.p. 64-66 °C
	19	C ₃ H ₇ iso	H	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{SC}_3\text{H}_7 \text{ iso} \end{array}$	m.p. 160-161 °C
25	20	C ₃ H ₇ iso	H	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{S}-\text{CH}-\text{CH}_2-\text{CH} \\ \quad \quad \quad \mid \quad \quad \quad \diagup \quad \diagdown \\ \quad \quad \quad \text{CH}_3 \quad \quad \quad \text{CH}_3 \quad \text{CH}_3 \end{array}$	m.p. 127-128 °C
30	21	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{S} \\ \parallel \\ -\text{P}-\text{O}-\text{CH}-\text{C}_2\text{H}_5 \\ \mid \\ \text{CH}_3 \end{array}$	m.p. 138 °C

35

Table 5 - continuation

5	Ex. No.	A	B	X	Y	Z _n	R	physical const.
	22	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{S} \\ \parallel \\ -\text{P}-\text{OC}_3\text{H}_7 \text{ iso} \\ \\ \text{CH}_3 \end{array}$	m.p. 150 °C
10	23	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{S} \\ \parallel \\ -\text{P}-\text{OC}_2\text{H}_5 \\ \\ \text{CH}_3 \end{array}$	m.p. 160 °C
15	24	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{S} \\ \parallel \\ -\text{P}-\text{OC}_2\text{H}_5 \\ \\ \text{OC}_2\text{H}_5 \end{array}$	m.p. 143 °C
20	25	CH ₃	CH ₃	CH ₃	CH ₃	6-CH ₃	$\begin{array}{c} \text{S} \\ \parallel \\ -\text{P}-\text{OCH}_2-\text{C}(\text{CH}_3)_3 \\ \\ \text{CH}_3 \end{array}$	m.p. 107 °C

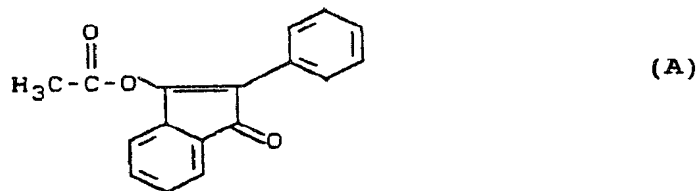
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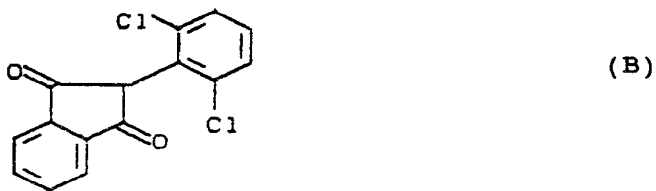
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Use Examples:

In the Use Examples which follow, the compounds listed below were employed as comparison substances:

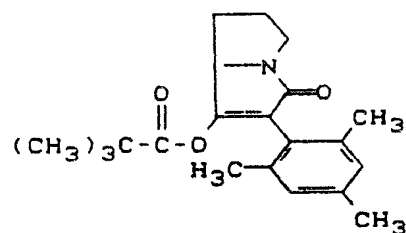


- 5 3-(Acetyloxy)-2-phenyl-1H-inden-1-one
(disclosed in US 4,104,043)



2-(2,6-Dichlorophenyl)-1H-inden-1,3(2H)-dione
(disclosed in US 3,954,998)

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(C)

2,2-Dimethyl-2,3,5,7a-tetrahydro-5-oxo-6-(2,4,6-trimethylphenyl)-1H-pyrrolidin-7-yl propionate (disclosed in EP-A 355,599).

Example A

Tetranychus test (OP resistant)

Solvent: 7 parts by weight of dimethylformamide
Emulsifier: 1 part by weight of alkylaryl polyglycol
5 ether

To produce a suitable preparation of active compound,
1 part by weight of active compound is mixed with the
stated amount of solvent and the stated amount of emul-
sifier, and the concentrate is diluted with water to the
10 desired concentration.

Bean plants (*Phaseolus vulgaris*) which are heavily
infested with all development stages of the common spider
mite or greenhouse red spider mite (*Tetranychus urticae*)
are treated by being dipped into the active compound
15 preparation of the desired concentration.

After the desired period, the destruction is determined
in %. 100% means that all spider mites have been
destroyed; 0% means that no spider mites have been
destroyed.

20 In this test, a superior activity compared with the prior
art is shown, for example, by the following compounds of
the Preparation Examples: 1, 2 and 5.

Example B

Nephotettix test

Solvent: 7 parts by weight of dimethylformamide

Emulsifier: 1 part by weight of alkylaryl polyglycol
ether

5

To produce a suitable preparation of active compound,
1 part by weight of active compound is mixed with the
stated amount of solvent and the stated amount of emul-
sifier, and the concentrate is diluted with water to the
desired concentration.

10

Rice seedlings (*Oryza sativa*) are treated by being dipped
into the active compound preparation of the desired
concentration and infested with the green rice cicada
(*Nephotettix cincticeps*) while the seedlings are still
moist.

15

After the desired period, the destruction is determined
in %. 100% means that all cicadae have been destroyed; 0%
means that no cicadae have been destroyed.

In this test, a superior activity compared with the prior
art is shown, for example, by the following compounds of
the Preparation Examples: 1, 2 and 5.

20

Phaedon larvae test

Solvent: 3 parts by weight of dimethylformamide
Emulsifier: 1 part by weight of alkylaryl polyglycol
5 ether

To produce a suitable preparation of active compound,
1 part by weight of active compound is mixed with the
stated amount of solvent and the stated amount of emul-
sifier, and the concentrate is diluted with water to the
10 desired concentration.

Cabbage leaves (*Brassica oleracea*) are treated by being
dipped into the active compound preparation of the
desired concentration and infested with mustard beetle
larvae (*Phaedon cochleariae*) while the seedlings are
15 still moist.

After the desired period, the destruction is determined
in %. 100% means that all beetle larvae have been
destroyed; 0% means that no beetle larvae have been
destroyed.

20 In this test, a superior activity compared with the prior
art is shown, for example, by the following compounds of
the Preparation Examples: 1, 2, 4 and 5.

Example

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Pre-emergence test

Solvent: 5 parts by weight of acetone

Emulsifier: 1 part by weight of alkylaryl polyglycol ether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent, the stated amount of emulsifier is added and the concentrate is diluted with water to the desired concentration.

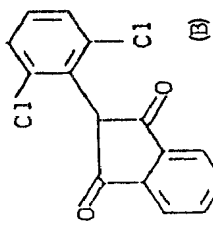
Seeds of the test plants are sown in normal soil and, after 24 hours, watered with the preparation of the active compound. It is expedient to keep constant the amount of water per unit area. The concentration of the active compound in the preparation is of no importance, only the amount of active compound applied per unit area being decisive. After three weeks, the degree of damage to the plants is rated in % damage in comparison to the development of the untreated control. The figures denote:

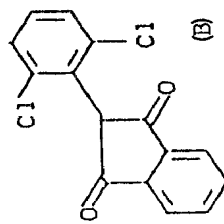
0 % = no action (like untreated control)
100 % = total destruction.

In this test, a superior activity with the prior art is shown, for example, by the compound of Preparation Example 2.

PRE-EMERGENCE-TEST / GREENHOUSE

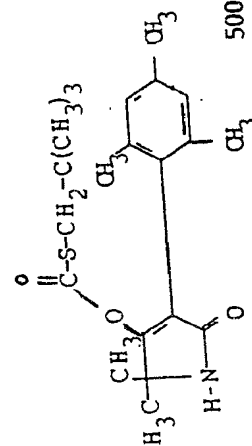
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Active compound	amount of active compound g/ha	Cotton	Alspecurus	Digitaria	Echinochloa	Setaria	Sorghum
 (B)	1 000	60	50	40	50	70	0
	500	0	80	90	95	100	95



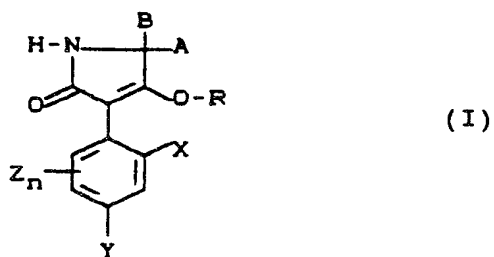
(B)

known compound
disclosed in US 3,954,998



(2)

1. A substituted 3-aryl-pyrrolidine-2,4-dione derivative of the general formula (I)



in which

- X represents alkyl, halogen or alkoxy,
- Y represents hydrogen, alkyl, halogen, alkoxy or halogenoalkyl,
- Z represents alkyl, halogen or alkoxy,
- n represents a number from 0-3,
- A represents hydrogen, or represents alkyl, alkoxyalkyl or alkylthioalkyl, each of which is optionally substituted by halogen, cycloalkyl which is optionally interrupted by hetero atoms, or represents aryl, arylalkyl or hetaryl, each of which is optionally substituted by halogen, alkyl, halogenoalkyl,

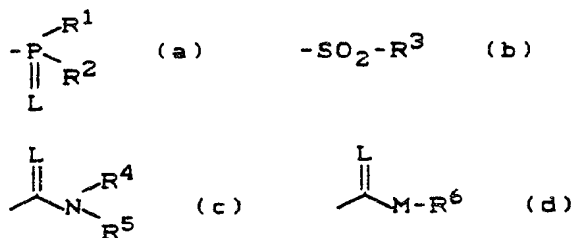
alkoxy or nitro,

B represents hydrogen, alkyl or alkoxyalkyl,

or in which

A and B together with the carbon atom to which they are bonded form an optionally substituted saturated or unsaturated ring which can be interrupted by oxygen and/or sulphur,

R represents the groups



in which

L and M represent oxygen or sulphur, and
L and M do not simultaneously
represent oxygen,

R¹, R² and R³ independently of each other
represent alkyl, alkoxy, alkylamino,
dialkylamino, alkylthio, alkenylthio,

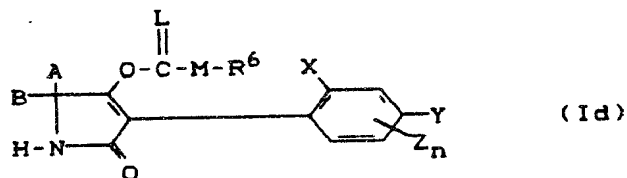
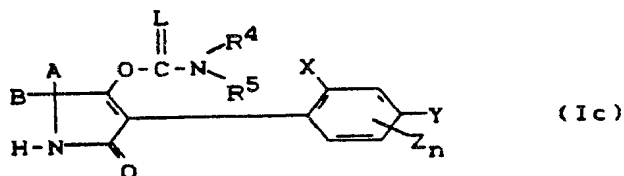
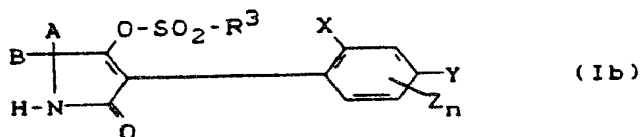
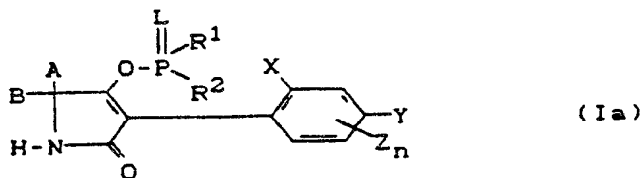
alkynylthio and cycloalkylthio, each of which is optionally substituted by halogen, and represent in each case optionally substituted phenyl, benzyl, phenoxy or phenylthio,

R^4 and R^5 independently of each other represent hydrogen, or represent alkyl, alkenyl, alkoxy or alkoxyalkyl, each of which is optionally substituted by halogen, or represent optionally substituted phenyl or optionally substituted benzyl, or R^4 and R^5 together represent an alkenyl radical which is optionally interrupted by oxygen,

R^6 represents alkyl which is optionally substituted by halogen and which can be interrupted by oxygen, or represents phenyl which is optionally substituted by halogen, halogenoalkyl or alkoxy, or represents benzyl which is optionally substituted by halogen, halogenoalkyl, alkyl and alkoxy, or represents alkenyl or alkynyl,

or a pure enantiomeric form thereof.

2. A substituted 3-aryl-pyrrolidine-2,4-dione derivative of the formulae (Ia) to (Id)



in which

A, B, L, M, X, Y, Zn, R¹, R², R³, R⁴, R⁵ and R⁶ have the meaning given in Claim 1.

3. A substituted 3-aryl-pyrrolidine-2,4-dione derivative of the general formula (I) according to Claim 1, in

which

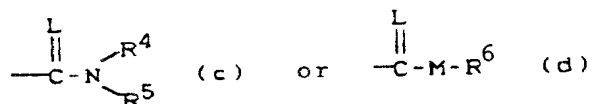
- X represents C₁-C₆-alkyl, halogen or C₁-C₆-alkoxy,
- Y represents hydrogen, C₁-C₆-alkyl, halogen, C₁-C₆-alkoxy or C₁-C₃-halogenoalkyl,
- Z represents C₁-C₆-alkyl, halogen or C₁-C₆-alkoxy,
- n represents a number from 0-3,
- A represents hydrogen or in each case straight-chain or branched C₁-C₁₂-alkyl, C₃-C₈-alkenyl, C₃-C₈-alkinyl, C₁-C₁₀-alkoxy-C₂-C₈-alkyl, C₁-C₈-polyalkoxy-C₂-C₈-alkyl and C₁-C₁₀-alkylthio-C₂-C₈-alkyl, each of which is optionally substituted by halogen, or represents cycloalkyl which has 3-8 ring atoms and which can be interrupted by oxygen and/or sulphur, or represents aryl, hetaryl or aryl-C₁-C₆-alkyl, each of which is optionally substituted by halogen, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₁-C₆-alkoxy or nitro,
- B represents hydrogen or in each case straight-chain or branched C₁-C₁₂-alkyl or C₁-C₆-alkoxy-alkyl,

or in which

A and B together with the carbon atom to which they

are bonded form a 3-to 8-membered saturated or unsaturated ring which can be interrupted by oxygen and/or sulphur and which can be substituted by in each case optionally halogenated alkyl, alkoxy or phenyl and halogen,

R represents the groups



in which

L and M in each case represent oxygen or sulphur and L and M do not simultaneously represent oxygen,

R¹, R² and R³ independently of each other represent C₁-C₈-alkyl, C₁-C₈-alkoxy, C₁-C₈-alkylamino, di-(C₁-C₈)-alkylamino, C₁-C₈-alkylthio, C₂-C₅-alkenylthio, C₂-C₅-alkinylthio and C₃-C₇-cycloalkylthio, each of which is optionally substituted by halogen, or represent phenyl, benzyl, phenoxy or phenylthio, each of which is optionally

substituted by halogen, nitro, cyano, C₁-C₄-alkoxy, C₁-C₄-halogenoalkoxy, C₁-C₄-alkylthio, C₁-C₄-halogenoalkylthio, C₁-C₄-alkyl or C₁-C₄-halogenoalkyl,

R⁴ and R⁵ independently of each other represents C₁-C₂₀-alkyl, C₁-C₂₀-alkoxy, C₂-C₈-alkenyl or C₁-C₂₀-alkoxy-C₁-C₂₀-alkyl, each of which is optionally substituted by halogen, or represents phenyl which is optionally substituted by halogen, C₁-C₂₀-halogenoalkyl, C₁-C₂₀-alkyl or C₁-C₂₀-alkoxy, or represents benzyl which is optionally substituted by halogen, C₁-C₂₀-alkyl, C₁-C₂₀-halogenoalkyl or C₁-C₂₀-alkoxy, or together represent a C₂-C₆-alkylene ring which is optionally interrupted by oxygen,

R⁶ represents C₁-C₂₀-alkyl which is optionally substituted by halogen and which can be interrupted by oxygen or represents phenyl which is optionally substituted by halogen, C₁-C₂₀-halogenoalkyl or C₁-C₂₀-alkoxy, or represents benzyl which is optionally substituted by halogen, C₁-C₂₀-halogenoalkyl or C₁-C₂₀-alkoxy, or represents C₂-C₈-alkenyl or C₂-C₅-alkinyl,

or a pure enantiomeric form thereof.

4. A substituted 3-aryl-pyrrolidine-2,4-dione derivative of the general formula (I) according to Claim 1, in which

X represents C₁-C₄-alkyl, halogen or C₁-C₄-alkoxy,

Y represents hydrogen, C₁-C₆-alkyl, halogen, C₁-C₄-alkoxy or C₁-C₂-halogenoalkyl,

Z represents C₁-C₄-alkyl, halogen or C₁-C₄-alkoxy,

n represents a number from 0-3,

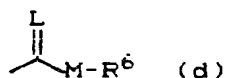
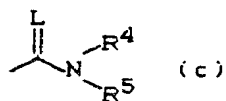
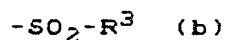
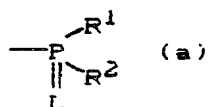
A represents hydrogen or in each case straight-chain or branched C₁-C₁₀-alkyl, C₃-C₆-alkenyl, C₃-C₆-alkinyl, C₁-C₆-alkoxy-C₂-C₆-alkyl, C₁-C₆-polyalkoxy-C₂-C₆-alkyl and C₁-C₆-alkylthio-C₂-C₆-alkyl, each of which is optionally substituted by halogen, or represents cycloalkyl having 3-7 ring atoms which can be interrupted by 1-2 oxygen and/or sulphur atoms, or represents aryl, hetaryl or aryl-C₁-C₄-alkyl, each of which is optionally substituted by halogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy or nitro,

B represents hydrogen or in each case straight-chain or branched C₁-C₁₀-alkyl or C₁-C₆-alkoxy-alkyl,

or in which

A and B together with the carbon atom to which they are bonded form a 3 to 7-membered saturated or unsaturated ring which can be substituted by C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-haloalkoxy, fluorine, chlorine and substituted phenyl, and which can be interrupted by oxygen and/or sulphur,

R represents the groups



in which

L and M in each case represent oxygen or sulphur and L and M do not simultaneously represent oxygen,

R¹, R² and R³ independently of one another represent C₁-C₆-alkyl, C₁-C₆-alkoxy, C₁-C₆-alkylamino, di-(C₁-C₆)-alkylamino, C₁-C₆-alkylthio, C₃-C₄-alkenylthio, C₂-C₄-alkinylthio and C₃-C₆-cycloalkylthio, each of which is optionally substituted by halogen, or represent phenyl, benzyl, phenoxy or

phenylthio, each of which is optionally substituted by fluorine, chlorine, bromine, nitro, cyano, C₁-C₃-alkoxy, C₁-C₃-halogenoalkoxy, C₁-C₃-alkylthio, C₁-C₃-halogenoalkylthio, C₁-C₃-alkyl or C₁-C₃-halogenoalkyl,

R⁴ and R⁵ independently of one another represents C₁-C₂₀-alkyl, C₁-C₂₀-alkoxy, C₂-C₈-alkenyl or C₁-C₂₀-alkoxy-C₁-C₂₀-alkyl, each of which is optionally substituted by halogen, or represents phenyl which is optionally substituted by halogen, C₁-C₅-halogenoalkyl, C₁-C₅-alkyl or C₁-C₅-alkoxy, or represents benzyl which is optionally substituted by halogen, C₁-C₅-alkyl, C₁-C₅-halogenoalkyl or C₁-C₅-alkoxy,

R⁶ represents C₁-C₂₀-alkyl which is optionally substituted by halogen and which can be interrupted by oxygen or represents phenyl which is optionally substituted by halogen, C₁-C₅-halogenoalkyl or C₁-C₅-alkoxy, or represents benzyl which is optionally substituted by halogen, C₁-C₅-halogenoalkyl or C₁-C₅-alkoxy,

or a pure enantiomeric form thereof.

5. A substituted 3-aryl-pyrrolidine-2,4-dione derivative of the general formula (I) according to Claim 1, in which

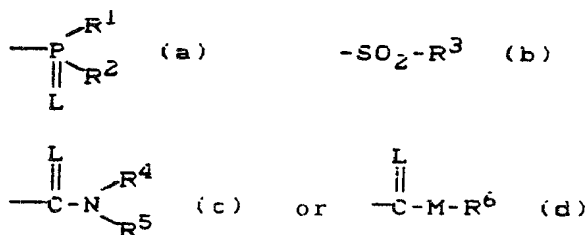
- X represents methyl, ethyl, propyl, i-propyl, fluorine, chlorine, bromine, methoxy and ethoxy,
- Y represents hydrogen, methyl, ethyl, propyl, i-propyl, butyl, i-butyl, tert.-butyl, fluorine, chlorine, bromine, methoxy, ethoxy and trifluoromethyl,
- Z represents methyl, ethyl, i-propyl, butyl, i-butyl, tert.-butyl, fluorine, chlorine, bromine, methoxy and ethoxy,
- n represents a number from 0-3,
- A represents hydrogen, or represents in each case straight-chain or branched C₁-C₈-alkyl, C₃-C₄-alkenyl, C₃-C₄-alkinyl, C₁-C₆-alkoxy-C₂-C₄-alkyl, C₁-C₄-polyalkoxy-C₂-C₄-alkyl and C₁-C₈-alkylthio-C₂-C₄-alkyl, each of which is optionally substituted by halogen, or represents cycloalkyl which has 3-6 ring atoms and which can be interrupted by 1-2 oxygen and/or sulphur atoms, or represents aryl, pyridine, imidazole, pyrazole, triazole, indole, thiazole or aryl-C₁-C₃-alkyl, each of which is optionally

substituted by fluorine , chlorine , bromine ,
methyl , ethyl , propyl , iso-propyl ,
methoxy , ethoxy , trifluoromethyl or nitro,
B represents hydrogen or in each case straight-
chain or branched C₁-C₈-alkyl or C₁-C₄-alkoxy-
alkyl,

or in which

A and B together with the carbon atom to which they
are bonded form a 3 to 6-membered saturated or
unsaturated ring which can be substituted by
C₁-C₄-alkyl, C₁-C₄-alkoxy, trifluoromethyl,
trifluoromethoxy, fluorine, chlorine and
substituted phenyl and which can be interrupted
by oxygen and/or sulphur,

R represents the groups



in which

L and M in each case represent oxygen or sulphur
and L and M do not simultaneously

represent oxygen,

R¹, R² and R³ independently of each other represent C₁-C₄-alkyl, C₁-C₄-alkoxy, C₁-C₄-alkylamino, di-(C₁-C₄-alkyl)amino or C₁-C₄-alkylthio, each of which is optionally substituted by fluorine or chlorine, or represent phenyl, benzyl, phenoxy or phenylthio, each of which is optionally substituted by fluorine, chlorine, bromine, nitro, cyano, C₁-C₂-alkoxy, C₁-C₄-fluoroalkoxy, C₁-C₂-chloroalkoxy, C₁-C₂-alkylthio, C₁-C₂-fluoroalkylthio, C₁-C₂-chloroalkylthio or C₁-C₃-alkyl,

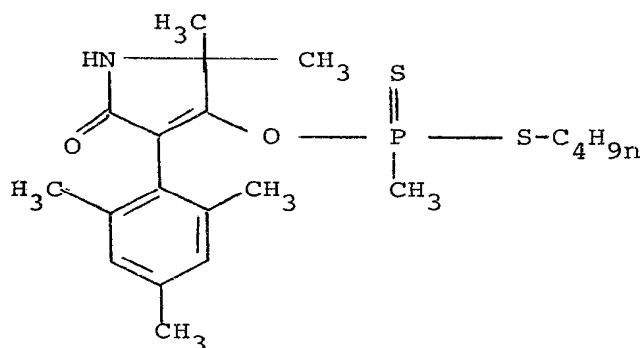
R⁴ and R⁵ independently of each other represent C₁-C₁₀-alkyl, C₁-C₁₀-alkoxy or C₁-C₁₀-alkoxy-(C₁-C₁₀)alkyl, each of which is optionally substituted by fluorine, chlorine or bromine, or represents phenyl which is optionally substituted by fluorine, chlorine, bromine, C₁-C₂₀-halogenoalkyl, C₁-C₂₀-alkyl or C₁-C₄-alkoxy, or represents benzyl which is optionally substituted by fluorine, chlorine, bromine, C₁-C₄-alkyl, C₁-C₄-halogenoalkyl or C₁-C₄-alkoxy,

R⁶ represents C₁-C₁₀-alkyl which is optionally substituted by fluorine, chlorine or bromine and which can be interrupted by

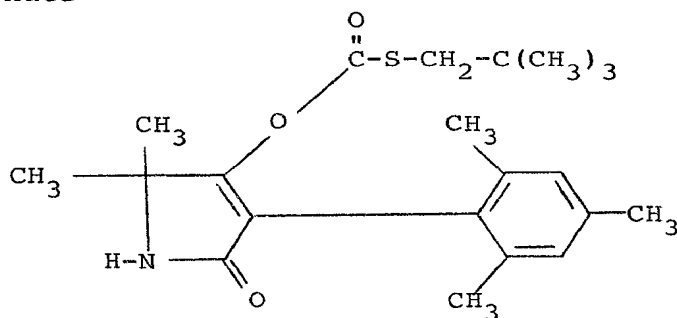
oxygen or represents phenyl which is optionally substituted by fluorine, chlorine, bromine, C_1-C_4 -halogenoalkyl or C_1-C_4 -alkoxy, or represents benzyl which is optionally substituted by fluorine, chlorine, bromine, C_1-C_4 -halogenoalkyl or C_1-C_4 -alkoxy,

or a pure enantiomeric form thereof.

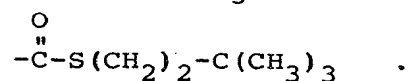
6. The compound of the formula O-[3-(2,4,6-trimethylphenyl)-5,5-dimethylpyrrolidin-2-on-] S-(n-butyl) methanedithio-phosphonate



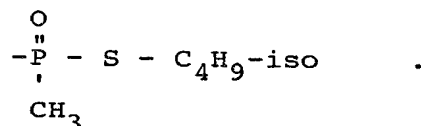
7. The compound of the formula S-(2,2-dimethylpropyl) O-[3-(2,4,6-trimethylphenyl)-5,5-dimethylpyrrolidin-2-one] thiocarbonate



8. A compound according to claim 1 in which A, B, X and Y are each methyl, Zn is 6-CH₃ and R is



9. A compound according to claim 1 in which A, B, X and Y are each methyl, Zn is 6-CH₃ and R is



10. A pesticidal or herbicidal composition comprising a pesticidally or herbicidally effective amount of a compound according to any one of claims 1 to 9 in admixture with a suitable carrier or diluent.

11. A pesticidal or herbicidal composition comprising a pesticidally or herbicidally effective amount of a compound according to any one of claims 1 to 9 in admixture with a solid diluent or carrier, a liquified normally gaseous diluent or carrier, or a liquid diluent or carrier containing a surface active agent.

12. A method of combating pests or combating weeds which comprises applying to the pests or weeds, or to a habitat thereof, a pesticidally or herbicidally effective amount of a compound according to any one of claims 1 to 9.

13. A method of combating pests or combating weeds which comprises applying to the pests or weeds, or to a habitat thereof, a pesticidally or herbicidally effective amount of a composition containing a compound according to any one of claims 1 to 9 in admixture with a suitable carrier or diluent.

14. A method of combating pests or combating weeds which comprises applying to the pests or weeds, or to a habitat thereof, a pesticidally or herbicidally effective amount of a composition containing between 0.1 and 95 % by weight of a compound according to any one of claims 1 to 9 in admixture with a suitable carrier or diluent.

15. A method of combating pests or combating weeds which comprises applying to the pests or weeds, or to a habitat thereof, a pesticidally or herbicidally effective amount of a composition containing between 0.5 and 90 % by weight of a compound according to any one of claims 1 to 9 in admixture with a suitable carrier or diluent.

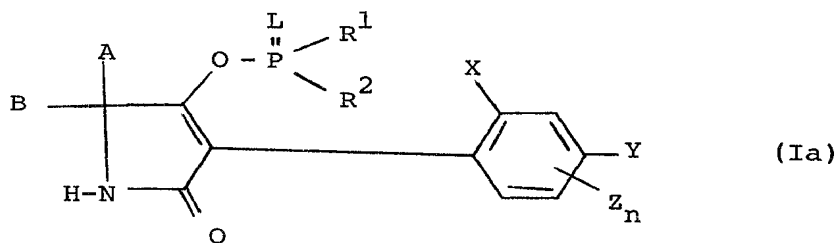
16. A method of combating weeds which comprises applying to the weeds, or to a habitat thereof, a herbicidally effective amount of a compound according to any one of claims 1 to 9 wherein the compound is applied as a pre-emergence herbicide.

17. A method of combating weeds which comprises applying to the weeds, or to a habitat thereof, a herbicidally effective amount of a compound according to any one of claims 1 to 9 wherein the compound is applied as a post-emergence herbicide.

18. A method of combating pests or combating weeds which comprises applying to the pests or weeds, or to a habitat thereof, a pesticidally or herbicidally effective amount of a compound according to any one of claims 1 to 9 wherein the compound is applied to an area of cultivation at a rate of between 0.01 and 10 kg/ha.

19. A method of combating pests or combating weeds which comprises applying to the pests or weeds, or to a habitat thereof, a pesticidally or herbicidally effective amount of a compound according to any one of claims 1 to 9 wherein the compound is applied to an area of cultivation at a rate of between 0.05 and 5 kg/ha.

20. A process for preparing a compound of formula I as defined in claim 1, wherein X, Y, Z, n, A, B, R, L, M, R¹, R², R³, R⁴, R⁵ and R⁶ are as defined in claim 1, which process comprises, for a substituted 3-aryl-pyrrolidine-2,4-dione of the formula (Ia)

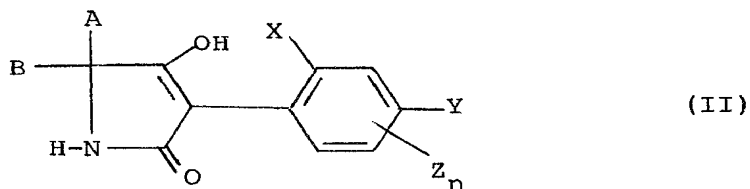


in which

A, B, L, X, Y, Z, R¹, R² and n have the abovementioned meaning,

A) reacting a 3-aryl-pyrrolidine-2,4-dione of the

formula (II) or an enol thereof



in which

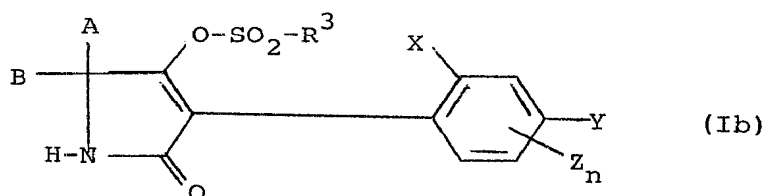
A, B, X, Y, Z and n have the abovementioned meaning with a phosphorus compound of the general formula (III)



in which

L, R¹ and R² have the abovementioned meaning and Hal represents halogen,

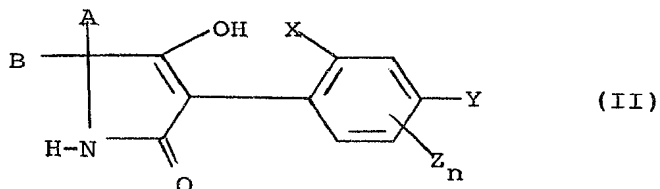
B) or to obtain a compound of the formula (Ib)



in which

A, B, X, Y, Z, R³ and n have the abovementioned meaning,

reacting a compound of the formula (II)



in which

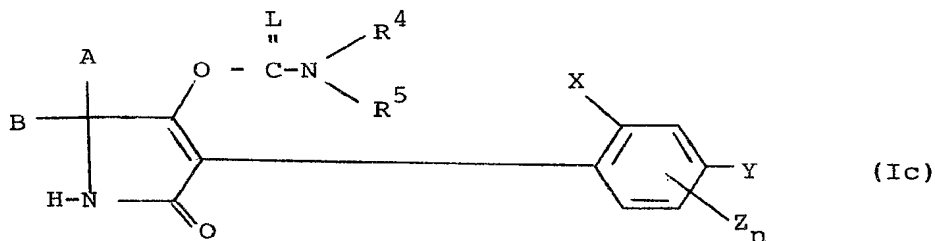
A, B, X, Y, Z and n have the abovementioned meaning,
with a sulphonyl chloride of the general formula (IV)



in which

R^3 has the abovementioned meaning,

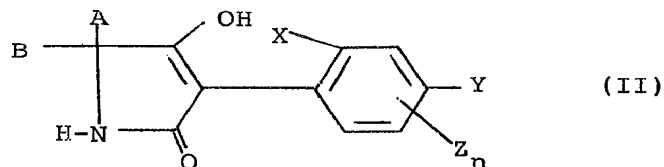
C) or to obtain a compound of the formula (Ic)



in which

A, B, L, X, Y, Z, R^4 , R^5 and n have the abovementioned meaning,

reacting a compound of the formula (II)



in which

A, B, X, Y, Z and n have the abovementioned meaning

either

α) with an isocyanate of the general formula (V)

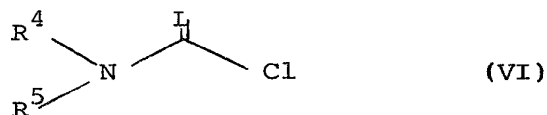


in which

R^4 has the abovementioned meaning, or

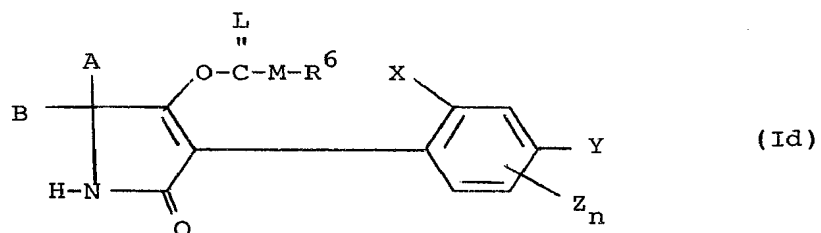
β) with a carbamic acid chloride or thiocarbamic acid

chloride of the general formula (VI)



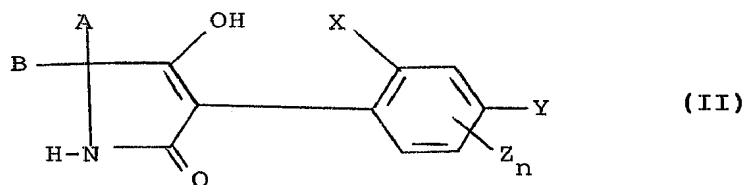
in which

L, R⁴ and R⁵ have the abovementioned meaning,
D) or to obtain a compound of the formula (Id)



in which

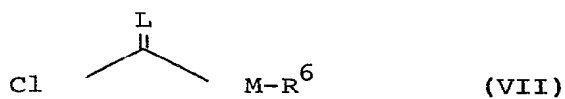
A, B, L, M, R⁶, X, Y, Z and n have the abovementioned meaning,
reacting a compound of the formula (II)



in which

A, B, X, Y, Z and n have the abovementioned meaning,
either

α) with a chloromonothioformic ester, chloroformic thioester or chlorodithioformic ester of the general formula VII



in which

L, M and R⁶ have the abovementioned meaning, or

β) with carbon disulphide and subsequently with an alkyl halide of the general formula VIII



in which

R⁶ has the abovementioned meaning and

Hal represents chlorine, bromine or iodine.

21. A process for preparing an insecticidal or acaricidal or herbicidal composition comprising admixing a 3-aryl-pyrrolidine-2,4-dione derivative of the formula (I) as defined in any one of claims 1 to 9 with a diluent or surface-active agent.

FETHERSTONHAUGH & CO.
OTTAWA, CANADA

PATENT AGENTS

SUBSTITUTE

REMPLACEMENT

SECTION is not Present

Cette Section est Absente